

(b) File all records and copies of reports at the premises where the operations are conducted.

(c) Make the files of records and copies of reports available to ATF officers during regular business hours for examination.

§20.268 Photographic copies of records.

(a) *General.* Permittees may record, copy, or reproduce required records. Any process may be used which accurately reproduces the original record, and which forms a durable medium for reproducing and preserving the original record.

(b) *Copies of records treated as original records.* Whenever records are reproduced under this section, the reproduced records will be preserved in conveniently accessible files, and provisions will be made for examining, viewing, and using the reproduced records the same as if they were the original record, and they will be treated and considered for all purposes as though they were the original record. All provisions of law and regulations applicable to the original are applicable to the reproduced record. As used in this section, "original record" means the record required by this part to be maintained or preserved by the permittee, even though it may be an executed duplicate or other copy of the document.

(Sec. 201, Pub. L. 85-859, 72 Stat. 1395, as amended (26 U.S.C. 5555))

PART 21—FORMULAS FOR DENATURED ALCOHOL AND RUM

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- 21.161 Weights and specific gravities of specially denatured alcohol.

AUTHORITY: 5 U.S.C. 552(a); 26 U.S.C. 5242, 7805.

SOURCE: T.D. ATF-133, 48 FR 24673, June 2, 1983, unless otherwise noted.

Subpart A—General Provisions

§ 21.1 Scope of regulations.

The regulations in this part relate to the formulation of completely denatured alcohol, specially denatured alco-

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hol, and specially denatured rum; to the specifications for denaturants; and to the uses of denatured spirits.

§ 21.2 Forms prescribed.

(a) *General.* The Director is authorized to prescribe all forms required by this part. All of the information called for in each form shall be furnished as indicated by the headings on the form and the instructions on or pertaining to the form. In addition, information called for in each form shall be furnished as required by this part.

(b) Requests for forms should be mailed to the ATF Distribution Center, 7943 Angus Court, Springfield, Virginia 22153.

[T.D. ATF-133, 48 FR 24673, June 2, 1983, as amended by T.D. ATF-249, 52 FR 5961, Feb. 27, 1987; T.D. 372, 61 FR 20724, May 8, 1996]

§ 21.3 Stocks of discontinued formulas.

Denaturers, or specially denatured spirits dealers or users, having on hand stocks of denaturants or formulas of specially denatured spirits no longer authorized by this part may—

(a) Continue to supply or use those stocks in accordance with existing permits until the stocks are exhausted;

(b) Use up those stocks in any manufacturing process approved by the Chief, Chemical Branch, pursuant to an application filed with him on ATF Form 5150.19, Formula for Articles made with Specially Denatured Alcohol and Rum;

(c) On approval of an application, filed with the regional director (compliance) and approved by him, destroy those stocks under whatever supervision the regional director (compliance) requires; or

(d) Otherwise dispose of those stocks in a manner satisfactory to the Director, pursuant to approval of an application (to be filed with the regional director (compliance) for transmittal to the Director).

§ 21.4 Related regulations.

The procedural and substantive requirements relative to the production of denatured alcohol and specially denatured rum are prescribed in Part 19 of this chapter, and those relative to the distribution and use of denatured alcohol and specially denatured rum

are prescribed in Part 20 of this chapter.

[T.D. ATF-133, 48 FR 24673, June 2, 1983, as amended by T.D. ATF-199, 50 FR 9183 Mar. 6, 1985]

§ 21.5 Denatured spirits for export.

Spirits may be denatured in accordance with formulas prescribed by the government of a foreign country to which the denatured spirits will be exported. However, the denaturer must first apply for and obtain written permission from the Director. The application shall be submitted to the Director and shall contain the following information:

(a) A complete list of ingredients for the spirits to be denatured.

(b) The exact amount of each ingredient to be used in denaturing the spirits.

(c) A copy (accompanied by an English translation as necessary) of the law or regulations of the foreign country to which the denatured spirits will be exported, specifying the denatured spirits formulation prescribed by that country.

§ 21.6 Incorporations by reference.

(a) "The United States Pharmacopoeia (Twentieth Revision, Official from July, 1980) and the National Formulary (Fifteenth Edition, Official from July 1, 1980)" published together as "The USP and NF Compendia," are incorporated by reference in this part. This incorporation by reference was approved by the Director of the Federal Register. The publication may be inspected at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC, and is available from the United States Pharmacopoeia Convention, Inc., 12601 Twinbrook Parkway, Rockville, Maryland 20852.

(b) Material from Parts 23, 25, and 29 of the 1980 Annual Book of ASTM Standards is incorporated by reference in this part. This incorporation by reference was approved by the Director of the Federal Register. These publications may be inspected at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC, and are available from the American Society for Testing and Materials, 1916

Race Street, Philadelphia, Pennsylvania 19103.

(c) Material from the "Official Methods of Analysis of the Association of Official Analytical Chemists (13th Edition 1980)" (AOAC) is incorporated by reference in this part. This incorporation by reference was approved by the Director of the Federal Register. This publication may be inspected at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC, and is available from the Association of Official Analytical Chemists, 11 North 19th Street, Suite 210, Arlington, Virginia 22209.

(Pub. L. 89-554, 80 Stat. 383 as amended (5 U.S.C. 552(a)))

Subpart B—Definitions

§ 21.11 Meaning of terms.

When used in this part and in forms prescribed under this part, unless the context otherwise requires, terms have the meanings given in this section. Words in the plural form include the singular, and vice versa, and words indicating the masculine gender include the feminine. The terms "includes" and "including" do not exclude things not mentioned which are in the same general class.

Alcohol. The spirits known as ethyl alcohol, ethanol, or spirits of wine, from whatever source or by whatever process produced. The term does not include such spirits as whisky, brandy, rum, gin, or vodka.

Chief, Chemical Branch. The Chief, Chemical Branch, Scientific Services Division, Bureau of Alcohol, Tobacco and Firearms, 1401 Research Boulevard, Rockville, MD 20850.

CFR. The Code of Federal Regulations.

C.D.A. Completely denatured alcohol.

Completely denatured alcohol. The spirits known as alcohol, as defined in this section, denatured pursuant to completely denatured alcohol formulas prescribed in subpart C of this part.

Denaturant. A material authorized by this part to be added to spirits in order to make those spirits unfit for beverage or internal human medicinal use.

Denatured spirits. Alcohol or rum to which denaturants have been added as provided in this part.

Director. The Director, Bureau of Alcohol, Tobacco and Firearms, the Department of the Treasury, Washington, DC 20226.

Essential oil. Any of the volatile odoriferous natural oils found in plants, which impart to such plants odor, and often other characteristic properties; also, imitations of such natural oils, as well as aromatic substances, and synthetic oils, which possess the denaturing characteristics of such natural oils.

Gallon. The liquid measure equivalent to the volume of 231 cubic inches.

Manufacturer or user. A person who holds a permit, issued under Part 20 of this chapter, to withdraw and use specially denatured alcohol or specially denatured rum, or to recover completely or specially denatured alcohol, or specially denatured rum, or articles manufactured with denatured spirits, or a distilled spirits plant proprietor qualified under Part 19 of this chapter as a processor.

N.F. The National Formulary. The latest edition is intended unless otherwise specified. The designations "U.S.P." and "N.F." are considered interchangeable when preparations are transferred from one publication to the other. (For incorporation by reference, see § 21.6(a).)

Proof. The ethyl alcohol content of a liquid at 60 degrees Fahrenheit, stated as twice the percent of ethyl alcohol by volume.

Regional director (compliance). The principal ATF regional official responsible for administering regulations in this part.

Rum. Any spirits produced from sugar cane products and distilled at less than 190 proof in such manner that the spirits possess the taste, aroma, and characteristics generally attributed to rum.

S.D.A. Specially denatured alcohol.

Specially denatured alcohol. Those spirits known as alcohol, as defined in this section, denatured pursuant to the specially denatured alcohol formulas authorized under subpart D of this part.

Specially denatured rum. Those spirits known as rum, as defined in this section, denatured pursuant to the specially denatured rum formula authorized under subpart D of this part.

Spirits or distilled spirits. Alcohol or rum as defined in this part.

U.S.C. The United States Code.

U.S.P. The United States Pharmacopoeia. The latest edition is intended unless otherwise specified. The designations "U.S.P." and "N.F." are considered interchangeable when preparations are transferred from one publication to the other. (For incorporation by reference, see § 21.6(a).)

[T.D. ATF-133, 48 FR 24673, June 2, 1983, as amended by T.D. ATF-199, 50 FR 9183, Mar. 6, 1985]

Subpart C—Completely Denatured Alcohol Formulas

§ 21.21 General.

(a) Alcohol shall be completely denatured only in accordance with formulas prescribed in this subpart (or in accordance with § 21.5).

(b) Denaturers may be authorized to add a small quantity of an odorant, rust inhibitor, or dye to completely denatured alcohol. Any such addition shall be made only on approval by the Chief, Chemical Branch. Request for such approval shall be submitted to the Chief, Chemical Branch.

(c) Odorants or perfume materials may be added to denaturants authorized for completely denatured alcohol in amounts not greater than 1 part to 250, by weight. However, such addition shall not decrease the denaturing value nor change the chemical or physical constants beyond the limits of the specifications for these denaturants as prescribed in subpart E, except as to odor. Proprietors of distilled spirits plants using denaturants to which such odorants or perfume materials have been added shall inform the Chief, Chemical Branch, in writing, of the names and properties of the odorants or perfume materials so used.

§ 21.22 Formula No. 18.

To every 100 gallons of ethyl alcohol of not less than 160 proof add:

2.50 gallons of either methyl isobutyl ketone, mixed isomers of nitropropane, or methyl *n*-butyl ketone;

0.125 gallon of pyronate or a similar compound;

0.50 gallon acetaldol (beta-hydroxybutyraldehyde); and

1.00 gallon of either kerosene, deodorized kerosene, gasoline, unleaded gasoline, rubber hydrocarbon solvent, or heptane.

§ 21.23 Formula No. 19.

To every 100 gallons of ethyl alcohol of not less than 160 proof add:

4.0 gallons of either methyl isobutyl ketone, mixed isomers of nitropropane, or methyl *n*-butyl ketone; and

1.0 gallon of either kerosene, deodorized kerosene, gasoline, unleaded gasoline, rubber hydrocarbon solvent, or heptane.

§ 21.24 Formula No. 20.

(a) *Formula*. To every 100 gallons of ethyl alcohol of not less than 195 proof add:

A total of 2.0 gallons of either unleaded gasoline, rubber hydrocarbon solvent, kerosene, or deodorized kerosene; or any combination of these.

(b) *Authorized use*. Restricted to fuel use, comparable to specially denatured alcohol "Use Code No." 611, 612, 613, 620, and 630.

Subpart D—Specially Denatured Spirits Formulas and Authorized Uses

§ 21.31 General.

(a) *Formulas for specially denatured spirits*. Alcohol and rum shall be specially denatured only in accordance with formulas prescribed in this subpart (or in accordance with § 21.5).

(b) *Proof of spirits for denaturation*. Alcohol of not less than 185 proof shall be used in the manufacture of all formulas of specially denatured alcohol, unless otherwise specifically stated or unless otherwise authorized by the Director. Rum for denaturation shall be of not less than 150 proof and may be denatured only in accordance with Formula No. 4.

(c) *Use of Denatured Spirits*. Users and manufacturers holding approved Forms 5150.19 (formerly 1479-A) covering use in processes or manufacture of products no longer authorized for a particular formula may continue that use. Pursuant to written application and subject to the provisions of 26 U.S.C. Chapter 51, Part 20 of this chapter, and this part, the Chief, Chemical Branch, may authorize the use of any formula

of specially denatured alcohol or specially denatured rum for uses not specifically authorized in this part. The code number before each item under "authorized uses" shall be used in reporting the use of specially denatured alcohol or specially denatured rum.

[T.D. ATF-133, 48 FR 24673, June 2, 1983, as amended by T.D. ATF-199, 50 FR 9183, Mar. 6, 1985]

§ 21.32 Formula No. 1.

(a) *Formula*. To every 100 gallons of alcohol add:

Four gallons of methyl alcohol and either $\frac{1}{8}$ avoirdupois ounce of denatonium benzoate, N.F., (BITREX); 1 gallon of methyl isobutyl ketone; 1 gallon of mixed isomers of nitropropane; or 1 gallon of methyl *n*-butyl ketone.

(b) *Authorized uses*. (1) As a solvent:

- 011. Cellulose coatings.
- 012. Synthetic resin coatings.
- 013. Shellac coatings.
- 014. Other natural resin coatings.
- 016. Other coatings.
- 021. Cellulose plastics.
- 022. Non-cellulose plastics, including resins.
- 031. Photographic film and emulsions.
- 032. Transparent sheeting.
- 033. Explosives.
- 034. Cellulose intermediates and industrial collodions.
- 035. Soldering flux.
- 036. Adhesives and binders.
- 041. Proprietary solvents.
- 042. Solvents and thinners (other than proprietary solvents or special industrial solvents).
- 043. Solvents, special (restricted sale).
- 051. Polishes.
- 052. Inks (not including meat branding inks).
- 053. Stains (wood, etc.).
- 141. Shampoos.
- 142. Soap and bath preparations.
- 311. Cellulose compounds (dehydration).
- 312. Sodium hydrosulfite (dehydration).
- 315. Other dehydration products.
- 320. Petroleum products.
- 331. Processing pectin.
- 332. Processing other food products.
- 341. Processing crude drugs.
- 342. Processing glandular products, vitamins, hormones, and yeasts.
- 343. Processing antibiotics and vaccines.
- 344. Processing medicinal chemicals (including alkaloids).
- 345. Processing blood and blood products.
- 349. Miscellaneous drug processing (including manufacture of pills).
- 351. Processing dyes and intermediates.
- 352. Processing perfume materials and fixatives.

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- 353. Processing photographic chemicals.
- 354. Processing rosin.
- 355. Processing rubber (latex).
- 358. Processing other chemicals.
- 359. Processing miscellaneous products.
- 410. Disinfectants, insecticides, fungicides, and other biocides.
- 420. Embalming fluids and related products.
- 430. Sterilizing and preserving solutions.
- 440. Industrial detergents and soaps.
- 450. Cleaning solutions (including household detergents).
- 481. Photoengraving and rotogravure dyes and solutions.
- 482. Other dye solutions.
- 485. Miscellaneous solutions (including duplicating fluids).

(2) As a raw material:

- 521. Ethyl acetate.
- 522. Ethyl chloride.
- 523. Other ethyl esters.
- 530. Ethylamines.
- 540. Dyes and intermediates.
- 551. Acetaldehyde.
- 552. Other aldehydes.
- 561. Ethyl ether.
- 562. Other ethers.
- 571. Ethylene dibromide.
- 572. Ethylene gas.
- 573. Xanthates.
- 574. Fulminate of mercury and other detonators.
- 575. Drugs and medicinal chemicals.
- 579. Other chemicals.

(3) As a fuel:

- 611. Automobile and supplementary fuels.
- 612. Airplane and supplementary fuels.
- 613. Rocket and jet fuels.
- 620. Proprietary heating fuels.
- 630. Other fuel uses.

(4) As a fluid:

- 710. Scientific instruments.
- 720. Brake fluids.
- 730. Cutting oil.
- 740. Refrigerating uses.
- 750. Other fluid uses.
- 760. Proprietary anti-freeze.

(5) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).
- 900. Specialized uses (unclassified).

[T.D. ATF-133, 48 FR 24673, June 2, 1983, as amended by T.D. ATF-199, 50 FR 9183, Mar. 6, 1985]

§ 21.33 Formula No. 2-B.

(a) *Formula.* To every 100 gallons of alcohol add:

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One-half gallon of benzene, $\frac{1}{2}$ gallon of rubber hydrocarbon solvent, or $\frac{1}{2}$ gallon of toluene.

(b) *Authorized uses.* (1) As a solvent:

- 021. Cellulose plastics.
- 022. Non-cellulose plastics, including resins.
- 031. Photographic film and emulsions.
- 032. Transparent sheeting.
- 033. Explosives.
- 311. Cellulose compounds (dehydration).
- 312. Sodium hydrosulfite (dehydration).
- 315. Other dehydration products.
- 320. Petroleum products.
- 331. Processing pectin.
- 332. Processing other food products.
- 341. Processing crude drugs.
- 342. Processing glandular products, vitamins, hormones, and yeasts.
- 343. Processing antibiotics and vaccines.
- 344. Processing medicinal chemicals (including alkaloids).
- 349. Miscellaneous drug processing (including manufacture of pills).
- 351. Processing dyes and intermediates.
- 352. Processing perfume materials and fixatives.
- 353. Processing photographic chemicals.
- 358. Processing other chemicals.
- 359. Processing miscellaneous products.

(2) As a raw material:

- 521. Ethyl acetate.
- 522. Ethyl chloride.
- 523. Other ethyl esters.
- 524. Sodium ethylate, anhydrous.
- 530. Ethylamines.
- 540. Dyes and intermediates.
- 551. Acetaldehyde.
- 552. Other aldehydes.
- 561. Ethyl ether.
- 562. Other ethers.
- 571. Ethylene dibromide.
- 572. Ethylene gas.
- 573. Xanthates.
- 575. Drugs and medicinal chemicals.
- 576. Organo-silicone products.
- 579. Other chemicals.

(3) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

(c) *Conditions governing use.* This formula shall be used in a closed and continuous system unless otherwise authorized by the Chief, Chemical Branch.

§ 21.34 Formula No. 2-C.

(a) *Formula.* To every 100 gallons of alcohol add:

Thirty-three pounds or more of metallic sodium and either $\frac{1}{2}$ gallon of benzene, $\frac{1}{2}$

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gallon of toluene, or ½ gallon of rubber hydrocarbon solvent.

(b) *Authorized uses.* (1) As a solvent:

- 344. Processing medicinal chemicals (including alkaloids).
- 358. Processing other chemicals.
- 359. Processing miscellaneous products.

(2) As a raw material:

- 523. Miscellaneous ethyl esters.
- 530. Ethylamines.
- 540. Dyes and intermediates.
- 575. Drugs and medicinal chemicals.
- 579. Other chemicals.

(3) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

(c) *Conditions governing use.* This formula shall be used in a closed and continuous system unless otherwise authorized by the Chief, Chemical Branch.

§ 21.35 Formula No. 3-A.

(a) *Formula.* To every 100 gallons of alcohol add:

Five gallons of methyl alcohol.

(b) *Authorized uses.* (1) As a solvent:

- 011. Cellulose coatings.
- 012. Synthetic resin coatings.
- 016. Other coatings.
- 021. Cellulose plastics.
- 022. Non-cellulose plastics, including resins.
- 031. Photographic film and emulsions.
- 032. Transparent sheeting.
- 033. Explosives.
- 034. Cellulose intermediates and industrial collodions.
- 035. Soldering flux.
- 036. Adhesives and binders.
- 041. Proprietary solvents.
- 043. Solvents, special (restricted sale).
- 051. Polishes.
- 052. Inks (including meat branding inks).
- 053. Stains (wood, etc.).
- 141. Shampoos.
- 142. Soap and bath preparations.
- 311. Cellulose compounds (dehydration).
- 312. Sodium hydrosulfite (dehydration).
- 315. Other dehydration products.
- 320. Petroleum products.
- 331. Processing pectin.
- 332. Processing other food products.
- 341. Processing crude drugs.
- 342. Processing glandular products, vitamins, hormones, and yeasts.
- 343. Processing antibiotics and vaccines.
- 344. Processing medicinal chemicals (including alkaloids).
- 345. Processing blood and blood products.

349. Miscellaneous drug processing (including manufacture of pills).

- 351. Processing dyes and intermediates.
- 352. Processing perfume materials and fixatives.
- 353. Processing photographic chemicals.
- 354. Processing rosin.
- 355. Processing rubber (latex).
- 358. Processing other chemicals.
- 359. Processing miscellaneous products.
- 410. Disinfectants, insecticides, fungicides, and other biocides.
- 420. Embalming fluids and related products.
- 430. Sterilizing and preserving solutions.
- 440. Industrial detergents and soaps.
- 450. Cleaning solutions (including household detergents).
- 470. Theater sprays, incense, and room deodorants.
- 481. Photoengraving and rotogravure dyes and solutions.
- 482. Other dye solutions.
- 485. Miscellaneous solutions (including duplicating fluids).

(2) As a raw material:

- 530. Ethylamines.
- 540. Dyes and intermediates.
- 575. Drugs and medicinal chemicals.
- 576. Organo-silicone products.
- 579. Other chemicals.
- 590. Synthetic resins.

(3) As a fuel:

- 611. Automobile and supplementary fuels.
- 612. Airplane and supplementary fuels.
- 613. Rocket and jet fuels.
- 620. Proprietary heating fuels.
- 630. Other fuel uses.

(4) As a fluid:

- 710. Scientific instruments.
- 720. Brake fluids.
- 730. Cutting oils.
- 740. Refrigerating uses.
- 750. Other fluid uses.

(5) Miscellaneous uses:

- 810. General laboratory and experimental use (own use only).
- 811. Laboratory reagents for sale.
- 812. Product development and pilot plant uses (own use only).
- 900. Specialized uses (unclassified).

[T.D. ATF-133, 48 FR 24673, June 2, 1983, as amended by T.D. ATF-199, 50 FR 9183, Mar. 6, 1985]

§ 21.36 Formula No. 3-B.

(a) *Formula.* To every 100 gallons of alcohol add:

One gallon of pine tar, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

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- 111. Hair and scalp preparations.
- 141. Shampoos.
- 142. Soap and bath preparations.
- 410. Disinfectants, insecticides, fungicides, and other biocides.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.37 Formula No. 3-C.

(a) *Formula.* To every 100 gallons of alcohol add:

Five gallons of isopropyl alcohol.

(b) *Authorized uses.* (1) As a solvent:

- 011. Cellulose coatings.
- 012. Synthetic resin coatings.
- 016. Other coatings.
- 021. Cellulose plastics.
- 022. Non-cellulose plastics, including resins.
- 031. Photographic film and emulsions.
- 032. Transparent sheeting.
- 033. Explosives.
- 034. Cellulose intermediates and industrial collodions.
- 035. Soldering flux.
- 036. Adhesives and binders.
- 043. Solvents, special (restricted sale).
- 051. Polishes.
- 052. Inks (including meat branding inks).
- 053. Stains (wood, etc.).
- 141. Shampoos.
- 142. Soaps and bath preparations.
- 311. Cellulose compounds (dehydration).
- 312. Sodium hydrosulfite (dehydration).
- 315. Other dehydration products.
- 320. Petroleum products.
- 331. Processing pectin.
- 332. Processing other food products.
- 341. Processing crude drugs.
- 342. Processing glandular products, vitamins, hormones, and yeasts.
- 343. Processing antibiotics and vaccines.
- 344. Processing medicinal chemicals (including alkaloids).
- 345. Processing blood and blood products.
- 349. Miscellaneous drug processing (including manufacture of pills).
- 351. Processing dyes and intermediates.
- 352. Processing perfume materials and fixatives.
- 353. Processing photographic chemicals.
- 354. Processing rosin.
- 355. Processing rubber (latex).
- 358. Processing other chemicals.
- 359. Processing miscellaneous products.
- 410. Disinfectants, insecticides, fungicides, and other biocides.
- 420. Embalming fluids and related products.
- 430. Sterilizing and preserving solutions.
- 440. Industrial detergents and soaps.
- 450. Cleaning solutions (including household detergents).

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- 470. Theater sprays, incense, and room deodorants.
- 481. Photoengraving and rotogravure dyes and solutions.
- 482. Other dye solutions.
- 485. Miscellaneous solutions (including duplicating fluids).

(2) As a raw material:

- 530. Ethylamines.
- 540. Dyes and intermediates.
- 575. Drugs and medicinal chemicals.
- 576. Organo-silicone products.
- 579. Other chemicals.
- 590. Synthetic resins.

(3) As a fuel:

- 611. Automobile and supplementary fuels.
- 612. Airplane and supplementary fuels.
- 613. Rocket and jet fuels.
- 620. Proprietary heating fuels.
- 630. Other fuel uses.

(4) As a fluid:

- 710. Scientific instruments.
- 720. Brake fluids.
- 730. Cutting oils.
- 740. Refrigerating uses.
- 750. Other fluid uses.

(5) Miscellaneous uses:

- 810. General laboratory and experimental use (own use only).
- 811. Laboratory reagents for sale.
- 812. Product development and pilot plant uses (own use only).
- 900. Specialized uses (unclassified).

(c) *Conditions governing use.* This formula shall not be used in manufacturing Reagent alcohol general-use formula under § 20.117 of this chapter.

[T.D. ATF-133, 48 FR 24673, June 2, 1983, as amended by T.D. ATF-199, 50 FR 9183, Mar. 6, 1985]

§ 21.38 Formula No. 4.

(a) *Formula.* To every 100 gallons of alcohol, or to every 100 gallons of rum of not less than 150 proof, add:

One gallon of the following solution: Five gallons of an aqueous solution containing 40 percent nicotine; 3.6 avoirdupois ounces of methylene blue, U.S.P.; and water sufficient to make 100 gallons.

(b) *Authorized uses.* (1) As a solvent:

- 460. Tobacco sprays and flavors.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.39 Formula No. 6-B.

(a) *Formula.* To every 100 gallons of alcohol add:

One-half gallon of pyridine bases.

(b) *Authorized uses.* (1) As a raw material:

- 523. Miscellaneous ethyl esters.
- 574. Fulminate of mercury and other detonators.
- 575. Drugs and medicinal chemicals.
- 579. Other chemicals.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.40 Formula No. 12-A.

(a) *Formula.* To every 100 gallons of alcohol add:

Five gallons of benzene, or 5 gallons of toluene.

(b) *Authorized uses.* (1) as a solvent:

- 021. Cellulose plastics.
- 022. Non-cellulose plastics, including resins.
- 036. Adhesives and binders.
- 342. Processing glandular products, vitamins, hormones, and yeasts.
- 343. Processing antibiotics and vaccines.
- 344. Processing medicinal chemicals (including alkaloids).
- 345. Processing blood and blood products.
- 351. Processing dyes and intermediates.
- 352. Processing perfume materials and fixatives.
- 354. Processing rosin.
- 358. Processing other chemicals.
- 359. Processing miscellaneous products.
- 430. Sterilizing and preserving solutions.

(2) As a raw material:

- 523. Miscellaneous ethyl esters.
- 530. Ethylamines.
- 540. Dyes and intermediates.
- 575. Drugs and medicinal chemicals.
- 579. Other chemicals.

(3) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.41 Formula No. 13-A.

(a) *Formula.* To every 100 gallons of alcohol add:

Ten gallons of ethyl ether.

(b) *Authorized uses.* (1) As a solvent:

- 015. Candy glazes.
- 021. Cellulose plastics.
- 022. Non-cellulose plastics, including resins.

- 031. Photographic film and emulsions.
- 032. Transparent sheeting.
- 034. Cellulose intermediates and industrial collodions.
- 052. Inks (not including meat branding inks).
- 241. Collodion, U.S.P.
- 331. Processing pectin.
- 332. Processing other food products.
- 342. Processing glandular products, vitamins, hormones, and yeasts.
- 343. Processing antibiotics and vaccines.
- 344. Processing medicinal chemicals (including alkaloids).
- 345. Processing blood and blood products.
- 349. Miscellaneous drug processing (including manufacture of pills).
- 352. Processing perfume materials and fixatives.
- 353. Processing photographic chemicals.
- 358. Processing other chemicals.
- 359. Processing miscellaneous products.
- 430. Sterilizing and preserving solutions.
- 481. Photoengraving and rotogravure solutions and dyes.

(2) As a raw material:

- 523. Miscellaneous ethyl esters.
- 561. Ethyl ether.
- 562. Other ethers.
- 575. Drugs and medicinal chemicals.
- 579. Other chemicals.

(3) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.42 Formula No. 17.

(a) *Formula.* To every 100 gallons of alcohol add:

Five-hundredths (0.05) gallon (6.4 fluid ounces) of bone oil (Dipple's oil).

(b) *Authorized uses.* (1) As a solvent:

- 344. Processing medicinal chemicals (including alkaloids).
- 358. Processing other chemicals.
- 359. Processing miscellaneous products.

(2) As a raw material:

- 575. Drugs and medicinal chemicals.
- 579. Other chemicals.

(3) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.43 Formula No. 18.

(a) *Formula.* To every 100 gallons of alcohol of not less than 160 proof add:

One hundred gallons of vinegar of not less than 90-grain strength or 150 gallons of vinegar of not less than 60-grain strength.

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(b) *Authorized uses.* (1) As a raw material:

511. Vinegar.

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

§ 21.44 Formula No. 19.

(a) *Formula.* To every 100 gallons of alcohol add:

One hundred gallons of ethyl ether.

(b) *Authorized uses.* (1) As a solvent:

031. Photographic film and emulsions.

034. Cellulose intermediates and industrial collodions.

241. Collodion, U.S.P.

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

§ 21.45 Formula No. 20.

(a) *Formula.* To every 100 gallons of alcohol add:

Five gallons of chloroform.

(b) *Authorized uses.* (1) As a raw material:

579. Miscellaneous chemicals (chloroform).

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

§ 21.46 Formula No. 22.

(a) *Formula.* To every 100 gallons of alcohol add:

Ten gallons of formaldehyde solution, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

420. Embalming fluids and related products.

430. Sterilizing and preserving solutions.

470. Theater sprays, incense, and room deodorants.

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

§ 21.47 Formula No. 23-A.

(a) *Formula.* To every 100 gallons of alcohol add:

Eight gallons of acetone, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

011. Cellulose coatings.

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012. Synthetic resin coatings.

013. Shellac coatings.

014. Other natural resin coatings.

015. Candy glazes.

016. Other coatings.

032. Transparent sheeting.

034. Cellulose intermediates and industrial collodions.

035. Soldering flux.

036. Adhesives and binders.

042. Solvents and thinners (other than proprietary solvents or special industrial solvents).

052. Inks (including meat branding inks).

053. Stains (wood, etc.).

111. Hair and scalp preparations.

112. Bay rum.

113. Lotions and creams (hand, face, and body).

114. Body deodorants and deodorant creams.

141. Shampoos.

142. Soaps and bath preparations.

210. External pharmaceuticals, not U.S.P. or N.F.

244. Antiseptic solutions, U.S.P. or N.F.

249. Miscellaneous external pharmaceuticals, U.S.P. or N.F.

331. Processing pectin.

332. Processing other food products.

341. Processing crude drugs.

342. Processing glandular products, vitamins, hormones, and yeasts.

343. Processing antibiotics and vaccines.

344. Processing medicinal chemicals (including alkaloids).

345. Processing blood and blood products.

349. Miscellaneous drug processing (including manufacture of pills).

358. Processing other chemicals.

359. Processing miscellaneous products.

410. Disinfectants, insecticides, fungicides, and other biocides.

420. Embalming fluids and related products.

430. Sterilizing and preserving solutions.

440. Industrial detergents and soaps.

450. Cleaning solutions (including household detergents).

482. Miscellaneous dye solutions.

485. Miscellaneous solutions.

(2) As a fluid:

740. Refrigerating uses.

750. Miscellaneous fluid uses.

(3) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

§ 21.48 Formula No. 23-F.

(a) *Formula.* To every 100 gallons of alcohol add:

Three pounds of salicylic acid, U.S.P., 1 pound of resorcinol (resorcin), U.S.P., and 1 gallon of bergamot oil, N.F. XI, or bay oil (myrcia oil), N.F. XI.

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(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 210. External pharmaceuticals, not U.S.P. or N.F.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.49 Formula No. 23-H.

(a) *Formula.* To every 100 gallons of alcohol add:

Eight gallons of acetone, U.S.P., and 1.5 gallons of methyl isobutyl ketone.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 113. Lotions and creams (hand, face, and body).
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 220. Rubbing alcohols.
- 410. Disinfectants, insecticides, fungicides, and other biocides.
- 450. Cleaning solutions (including household detergents).

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.50 Formula No. 25.

(a) *Formula.* To every 100 gallons of alcohol add:

Twenty pounds of iodine, U.S.P., and 15 pounds of either potassium iodide, U.S.P., or sodium iodide, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

- 230. Tinctures of iodine.
- 249. Miscellaneous external pharmaceuticals, U.S.P. or N.F.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.51 Formula No. 25-A.

(a) *Formula.* To every 100 gallons of alcohol add:

A solution composed of 20 pounds of iodine, U.S.P.; 15 pounds of either potassium iodide, U.S.P., or sodium iodide, U.S.P.; and 15 pounds of water.

(b) *Authorized uses.* (1) As a solvent:

- 230. Tinctures of iodine.
- 249. Miscellaneous external pharmaceuticals, U.S.P. or N.F.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.52 Formula No. 27.

(a) *Formula.* To every 100 gallons of alcohol add:

One gallon of rosemary oil, N.F. XII, and 30 pounds of camphor, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

- 210. External pharmaceuticals, not U.S.P. or N.F.
- 243. Liniments, U.S.P. or N.F.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.53 Formula No. 27-A.

(a) *Formula.* To every 100 gallons of alcohol add:

Thirty-five pounds of camphor, U.S.P., and 1 gallon of clove oil, N.F.

(b) *Authorized uses.* (1) As a solvent:

- 210. External pharmaceuticals, not U.S.P. or N.F.
- 410. Disinfectants, insecticides, fungicides, and other biocides.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.54 Formula No. 27-B.

(a) *Formula.* To every 100 gallons of alcohol add:

One gallon of lavender oil, N.F., and 100 pounds of green soap, U.S.P.

NOTE.—The requirements of this formula may be met by adding 1 gallon of lavender oil, N.F., and 66.5 pounds of U.S.P. quality soap concentrate containing 25 percent water to 100 gallons of alcohol and, after mixing, by adding thereto 33.5 pounds of water and again mixing.

(b) *Authorized uses.* (1) As a solvent:

- 141. Shampoos.
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 243. Liniments, U.S.P. or N.F.
- 410. Disinfectants insecticides, fungicides, and other biocides.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.55 Formula No. 28-A.

(a) *Formula.* To every 100 gallons of alcohol add:

One gallon or any combination totaling 1 gallon of either gasoline, unleaded gasoline, heptane, or rubber hydrocarbon solvent.

(b) *Authorized uses.* (1) As a fuel:

- 611. Automobile and supplementary fuels.
- 612. Airplane and supplementary fuels.
- 613. Rocket and jet fuels.
- 620. Proprietary heating fuels.
- 630. Other fuel uses.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.56 Formula No. 29.

(a) *Formula.* To every 100 gallons of alcohol add:

One gallon of 100 percent acetaldehyde or 5 gallons of an alcohol solution of acetaldehyde containing not less than 20 percent acetaldehyde, or 1 gallon of ethyl acetate having an ester content of 100 percent, or, where approved by the Chief, Chemical Branch, as to material and quantity, not less than 6.8 pounds if solid, or 1 gallon if liquid, of any chemical. When material other than acetaldehyde or ethyl acetate is proposed to be used, the user shall submit an application for such use to the Chief, Chemical Branch. The application shall include specifications, assay methods, and an 8-ounce sample of the substitute material for analysis.

(b) *Authorized uses.* (1) As a raw material:

- 511. Vinegar.
- 512. Acetic acid.
- 521. Ethyl acetate.
- 522. Ethyl chloride.
- 523. Other ethyl esters.
- 530. Ethylamines.
- 540. Dyes and intermediates.
- 551. Acetaldehyde.
- 552. Other aldehydes.
- 561. Ethyl ether.
- 562. Other ethers.
- 571. Ethylene dibromide.
- 572. Ethylene gas.
- 573. Xanthates.
- 575. Drugs and medicinal chemicals.
- 579. Other chemicals.
- 580. Synthetic rubber.
- 590. Synthetic resins.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

(c) *Conditions governing use.* This formula is restricted to processes in which the alcohol loses its identity by being converted into other chemicals.

§ 21.57 Formula No. 30.

(a) *Formula.* To every 100 gallons of alcohol add:

Ten gallons of methyl alcohol.

(b) *Authorized uses.* (1) As a solvent:

- 011. Cellulose coatings.
 - 012. Synthetic resin coatings.
 - 021. Cellulose plastics.
 - 022. Non-cellulose plastics, including resins.
 - 031. Photographic film and emulsions.
 - 035. Soldering flux.
 - 036. Adhesives and binders.
 - 042. Solvents and thinners (other than proprietary solvents or special industrial solvents).
 - 051. Polishes.
 - 052. Inks (not including meat branding inks).
 - 053. Stains.
 - 142. Soap and bath preparations.
 - 331. Processing pectin.
 - 332. Processing other food products.
 - 341. Processing crude drugs.
 - 342. Processing glandular products, vitamins, hormones, and yeasts.
 - 343. Processing antibiotics and vaccines.
 - 344. Processing medicinal chemicals (including alkaloids).
 - 345. Processing blood and blood products.
 - 349. Miscellaneous drug processing (including manufacture of pills).
 - 352. Processing perfume materials and fixatives.
 - 353. Processing photographic chemicals.
 - 358. Processing other chemicals.
 - 359. Processing miscellaneous products.
 - 410. Disinfectants, insecticides, fungicides, and other biocides.
 - 430. Sterilizing and preserving solutions.
 - 440. Industrial detergents and soaps.
 - 450. Cleaning solutions (including household detergents).
 - 481. Photoengraving and rotogravure solutions and dyes.
 - 482. Other dye solutions.
 - 485. Miscellaneous solutions (including duplicating fluids).
- (2) As a raw material:
- 575. Drugs and medicinal chemicals.
 - 576. Organo-silicone products.
 - 579. Other chemicals.
 - 590. Synthetic resins.

(3) As a fluid in:

- 740. Refrigerating uses.
- 750. Other fluid uses:

(4) Miscellaneous uses:

- 810. General laboratory and experimental use (own use only).
- 811. Laboratory reagents for sale.
- 812. Product development and pilot plant uses (own use only).

§ 21.58 Formula No. 31-A.

(a) *Formula.* To every 100 gallons of alcohol add:

One hundred pounds of glycerin (glycerol), U.S.P., and 20 pounds of hard soap, N.F. XI.

(b) *Authorized uses.* (1) As a solvent:

- 113. Lotions and creams (hands, face, and body).
- 131. Tooth paste and tooth powder.
- 141. Shampoos.

(2) *Miscellaneous uses:*

- 812. Product development and pilot plant uses (own use only).

§ 21.59 Formula No. 32.

(a) *Formula.* To every 100 gallons of alcohol add:

Five gallons of ethyl ether.

(b) *Authorized uses.* (1) As a solvent:

- 031. Photographic film and emulsions.
- 034. Cellulose intermediates and industrial collodions.
- 052. Inks (not including meat branding inks).
- 241. Collodion, U.S.P.
- 311. Ethyl cellulose compounds (dehydration).
- 332. Processing miscellaneous food products.
- 342. Processing glandular products, vitamins, hormones, and yeasts.
- 343. Processing antibiotics and vaccines.
- 344. Processing medicinal chemicals (including alkaloids).
- 430. Sterilizing and preserving solutions.
- 481. Photoengraving and rotogravure solutions and dyes.

(2) *As a raw material:*

- 522. Ethyl chloride.
- 523. Other ethyl esters.
- 561. Ethyl ether.
- 562. Other ethers.
- 571. Ethylene dibromide.
- 572. Ethylene gas.
- 575. Drugs and medicinal chemicals.
- 579. Other chemicals.
- 580. Synthetic rubber.

(3) *Miscellaneous uses:*

- 812. Product development and pilot plant uses (own use only).

§ 21.60 Formula No. 33.

(a) *Formula.* To every 100 gallons of alcohol add:

Thirty pounds of gentian violet or gentian violet, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

- 052. Inks (not including meat branding inks).
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 249. Miscellaneous external pharmaceuticals, U.S.P. or N.F.

(2) *Miscellaneous uses:*

- 812. Product development and pilot plant uses (own use only).

(c) *Conditions governing use.* Meat branding inks made with Formula No. 33 do not meet U.S. Department of Agriculture meat inspection specifications for use in Federally inspected establishments. Specially denatured alcohol Formulas No. 3-A, 3-C, and 23-A are authorized for this purpose.

§ 21.61 Formula No. 35.

(a) *Formula.* To every 100 gallons of alcohol add:

29.75 gallons of ethyl acetate having an ester content of 100 percent by weight or the equivalent thereof not to exceed 35 gallons of ethyl acetate with an ester content of not less than 85 percent by weight.

(b) *Authorized uses.* (1) As a solvent:

- 015. Candy glazes.

(2) *Miscellaneous uses:*

- 812. Product development and pilot plant uses (own use only).

§ 21.62 Formula No. 35-A.

(a) *Formula.* To every 100 gallons of alcohol add:

4.25 gallons of ethyl acetate having an ester content of 100 percent by weight or the equivalent thereof not to exceed 5 gallons of ethyl acetate with an ester content of not less than 85 percent by weight.

(b) *Authorized uses.* (1) As a solvent:

- 015. Candy glazes.
- 331. Processing pectin.
- 332. Processing other food products.
- 342. Processing glandular products, vitamins, hormones, and yeasts.
- 343. Processing antibiotics and vaccines.
- 344. Processing medicinal chemicals (including alkaloids).

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- 349. Miscellaneous drug processing (including manufacture of pills).
- 358. Processing miscellaneous chemicals.
- 359. Processing miscellaneous products.

(2) As a raw material:

- 511. Vinegar.
- 512. Acetic acid.
- 521. Ethyl acetate.
- 523. Other ethyl esters.
- 590. Synthetic resins.
- 910. Animal feed supplements.

(3) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.63 Formula No. 36.

(a) *Formula.* To every 100 gallons of alcohol add:

Three gallons of ammonia, aqueous, 27 to 30 percent by weight; 3 gallons of strong ammonia solution, N.F.: 17.5 pounds of caustic soda, liquid grade, containing 50 percent sodium hydroxide by weight; or 12.0 pounds of caustic soda, liquid grade, containing 73 percent sodium hydroxide by weight.

(b) *Authorized uses.* (1) As a solvent:

- 141. Shampoos.
- 142. Soap and bath preparations.
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 450. Cleaning solutions (including household detergents).

(2) As a raw material:

- 530. Ethylamines.
- 540. Dyes and intermediates.
- 579. Other chemicals.

(3) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.64 Formula No. 37.

(a) *Formula.* To every 100 gallons of alcohol add:

Forty-five fluid ounces of eucalyptol, N.F. XII, 30 avoirdupois ounces of thymol, N.F., and 20 avoirdupois ounces of menthol, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 112. Bay rum.
- 113. Lotions and creams (hand, face, and body).
- 131. Dentifrices.
- 132. Mouth washes.
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 244. Antisepetic solutions, U.S.P. or N.F.

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- 410. Disinfectants, insecticides, fungicides, and other biocides.
- 430. Sterilizing and preserving solutions.
- 470. Theater sprays, incense, and room deodorants.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.65 Formula No. 38-B.

(a) *Formula.* To every 100 gallons of alcohol add:

Ten pounds of any one, or a total of 10 pounds of two or more, of the oils and substances listed below:

Anethole, N.F.
Anise oil, N.F.
Bay oil (myrcia oil), N.F. XI.
Benzaldehyde, N.F.
Bergamot oil, N.F. XI.
Bitter almond oil, N.F. X.
Camphor, U.S.P.
Cedar leaf oil, U.S.P. XIII.
Chlorothymol, N.F. XII.
Cinnamic aldehyde, N.F. IX.
Cinnamon oil, N.F.
Citronella oil, natural.
Clove oil, N.F.
Coal tar, U.S.P.
Eucalyptol, N.F. XII.
Eucalyptus oil, N.F.
Eugenol, U.S.P.
Guaiacol, N.F. X.
Lavender oil, N.F.
Menthol, U.S.P.
Methyl salicylate, N.F.
Mustard oil, volatile (allyl isothiocyanate), U.S.P. XII.
Peppermint oil, N.F.
Phenol, U.S.P.
Phenyl salicylate (salol), N.F. XI.
Pine oil, N.F. XII.
Pine needle oil, dwarf, N.F.
Rosemary oil, N.F. XII.
Safrole.
Sassafras oil, N.F. XI.
Spearment oil, N.F.
Spearment oil, terpeneless.
Spike lavender oil, natural.
Storax, U.S.P.
Thyme oil, N.F. XII.
Thymol, N.F.
Tolu balsam, U.S.P.
Turpentine oil, N.F. XI.

If it is shown that none of the above single denaturants or combinations can be used in the manufacture of a particular product, the user may submit an application to the Chief, Chemical Branch, requesting permission to use another essential oil or substance having denaturing properties satisfactory to the Chief, Chemical Branch. In such a case the user shall furnish the Chief, Chemical Branch, with specifications, assay methods,

the name and address of the manufacturer, and an 8-ounce sample of the denaturant for analysis.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 112. Bay rum.
- 113. Lotions and creams (hand, face, and body).
- 114. Deodorants (body).
- 121. Perfumes and perfume tinctures.
- 122. Toilet waters and colognes.
- 131. Dentifrices.
- 132. Mouth washes.
- 141. Shampoos.
- 142. Soap and bath preparations.
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 243. Liniments, U.S.P. or N.F.
- 244. Antiseptic solutions, U.S.P. or N.F.
- 249. Miscellaneous external pharmaceuticals, U.S.P. or N.F.
- 349. Miscellaneous drug processing (including manufacture of pills).
- 410. Disinfectants, insecticides, fungicides, and other biocides.
- 430. Sterilizing and preserving solutions.
- 470. Theater sprays, incense, and room deodorants.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.66 Formula No. 38-C.

(a) *Formula.* To every 100 gallons of alcohol add:

Ten pounds of menthol, U.S.P., and 1.25 gallons of formaldehyde solution, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

- 131. Dentifrices.
- 132. Mouth washes.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.67 Formula No. 38-D.

(a) *Formula.* To every 100 gallons of alcohol add:

Two and one-half pounds of menthol, U.S.P., and 2.5 gallons of formaldehyde solution, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

- 131. Dentifrices.
- 132. Mouth washes.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.68 Formula No. 38-F.

(a) *Formula.* To every 100 gallons of alcohol add:

(1) Six pounds of either boric acid, N.F., or Polysorbate 80, N.F.; 1½ pounds of thymol, N.F.; 1½ pounds of chlorothymol, N.F. XII; and 1½ pounds of menthol, U.S.P.; or

(2) A total of at least 3 pounds of any two or more denaturing materials listed under Formula No. 38-B, plus sufficient boric acid, N.F., or Polysorbate 80, N.F., to total 10 pounds of denaturant; or

(3) Seven pounds of zinc chloride, U.S.P., 2.6 fluid ounces of hydrochloric acid, N.F., and a total of 3 pounds of any two or more of the denaturing materials listed under Formula No. 38-B.

(b) *Authorized uses.* (1) As a solvent:

- 132. Mouth washes.
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 244. Antiseptic solutions, U.S.P. or N.F.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.69 Formula No. 39.

(a) *Formula.* To every 100 gallons of alcohol add:

Nine pounds of sodium salicylate, U.S.P., or salicylic acid, U.S.P.; 1.25 gallons of fluid extract of quassia, N.F. VII; and ½ gallon of *tert*-butyl alcohol.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 112. Bay rum.
- 113. Lotions and creams (hand, face, and body).
- 121. Perfume and perfume tinctures.
- 122. Toilet waters and colognes.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.70 Formula No. 39-A.

(a) *Formula.* To every 100 gallons of alcohol add:

Sixty avoirdupois ounces of any one of the following alkaloids or salts together with ½ gallon of *tert*-butyl alcohol:

Quinine, N.F. X.
Quinine bisulfate, N.F. XI.
Quinine dihydrochloride, N.F. XI.
Cinchonidine.
Cinchonidine sulfate, N.F. IX.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.

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- 122. Toilet waters and colognes.
- 141. Shampoos.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.71 Formula No. 39-B.

- (a) *Formula.* To every 100 gallons of alcohol add:

Two and one-half gallons of diethyl phthalate and $\frac{1}{8}$ gallon of *tert*-butyl alcohol.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 112. Bay rum.
- 113. Lotions and creams (hand, face, and body).
- 114. Deodorants (body).
- 121. Perfumes and perfume tinctures.
- 122. Toilet waters and colognes.
- 141. Shampoos.
- 142. Soap and bath preparations.
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 410. Disinfectants, insecticides, fungicides, and other biocides.
- 450. Cleaning solutions (including household detergents).
- 470. Theater sprays, incense, and room deodorants.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.72 Formula No. 39-C.

- (a) *Formula.* To every 100 gallons of alcohol add:

One gallon of diethyl phthalate.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 113. Lotions and creams (hand, face, and body).
- 114. Deodorants (body).
- 121. Perfumes and perfume tinctures.
- 122. Toilet waters and colognes.
- 142. Soaps and bath preparations.
- 470. Theater sprays, incense, and room deodorants.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.73 Formula No. 39-D.

- (a) *Formula.* To every 100 gallons of alcohol add:

One gallon of bay oil (myrcia oil), N.F. XI, and either 50 avoirdupois ounces of quinine

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sulfate, U.S.P., 50 avoirdupois ounces of sodium salicylate, U.S.P.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 112. Bay rum.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.74 Formula No. 40.

- (a) *Formula.* To every 100 gallons of alcohol add $\frac{1}{8}$ gallon of *tert*-butyl alcohol, and:

One and one-half avoirdupois ounces of either (1) brucine alkaloid, (2) brucine sulfate, N.F. IX, (3) quassin, or (4) any combination of two or of three of those denaturants.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 112. Bay rum.
- 113. Lotions and creams (hand, face, and body).
- 114. Deodorants (body).
- 121. Perfumes and perfume tinctures.
- 122. Toilet waters and colognes.
- 141. Shampoos.
- 142. Soaps and bath preparations.
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 410. Disinfectants, insecticides, fungicides, and other biocides.
- 450. Cleaning solutions (including household detergents).
- 470. Theater sprays, incense, and room deodorants.

(2) Miscellaneous uses:

- 812. Product development and pilot plant uses (own use only).

§ 21.75 Formula No. 40-A.

- (a) *Formula.* To every 100 gallons of alcohol add:

One pound of sucrose octaacetate and $\frac{1}{8}$ gallon of *tert*-butyl alcohol.

(b) *Authorized uses.* (1) As a solvent:

- 111. Hair and scalp preparations.
- 112. Bay rum.
- 113. Lotions and creams (hand, face, and body).
- 114. Deodorants (body).
- 121. Perfumes and perfume tinctures.
- 122. Toilet waters and colognes.
- 141. Shampoos.
- 142. Soaps and bath preparations.
- 210. External pharmaceuticals, not U.S.P. or N.F.
- 410. Disinfectants, insecticides, fungicides, and other biocides.

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450. Cleaning solutions (including household detergents).

470. Theater sprays, incense, and room deodorants.

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

§ 21.76 Formula No. 40-B.

(a) *Formula.* To every 100 gallons of alcohol add:

One-sixteenth avoirdupois ounce of denatonium benzoate, N.F. (BITREX), and $\frac{1}{8}$ gallon of *tert*-butyl alcohol.

(b) *Authorized uses.* (1) As a solvent:

111. Hair and scalp preparations.

112. Bay rum.

113. Lotions and creams (hand, face, and body).

114. Deodorants (body).

121. Perfumes and perfume tinctures.

122. Toilet waters and colognes.

141. Shampoos.

142. Soaps and bath preparations.

210. External pharmaceuticals, not U.S.P. or N.F.

410. Disinfectants, insecticides, fungicides, and other biocides.

450. Cleaning solutions (including household detergents).

470. Theater sprays, incense, and room deodorants.

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

21.77 Formula No. 40-C.

(a) *Formula.* To every 100 gallons of alcohol add:

Three gallons of *tert*-butyl alcohol.

(b) *Authorized uses.* (1) As a solvent:

111. Hair and scalp preparations.

112. Bay rum.

113. Lotions and creams (hand, face, and body).

114. Deodorants (body).

121. Perfumes and perfume tinctures.

122. Toilet waters and colognes.

141. Shampoos.

142. Soaps and bath preparations.

210. External pharmaceuticals, not U.S.P. or N.F.

410. Disinfectants, insecticides, fungicides, and other biocides.

450. Cleaning solutions (including household detergents).

470. Theater sprays, incense, and room deodorants.

485. Miscellaneous solutions.

(2) Miscellaneous uses.

812. Product development and pilot plant uses (own use only).

(c) *Conditions governing use.* This formula shall be used only in the manufacture of products which will be packaged in pressurized containers in which the liquid contents are in intimate contact with the propellant and from which the contents are not easily removable in liquid form.

§ 21.78 Formula No. 42.

(a) *Formula.* To every 100 gallons of alcohol add:

(1) Eighty grams of potassium iodide, U.S.P., and 109 grams of red mercuric iodide, N.F. XI; or

(2) Ninety-five grams of thimerosal, U.S.P.; or

(3) Seventy-six grams of any of the following: phenyl mercuric nitrate, N.F.; phenyl mercuric chloride, N.F. IX; or phenyl mercuric benzoate.

(b) *Authorized uses.* (1) As a solvent:

430. Sterilizing and preserving solutions.

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

§ 21.79 Formula No. 44.

(a) *Formula.* To every 100 gallons of alcohol add:

Ten gallons of *n*-butyl alcohol

(b) *Authorized uses.* (1) As a solvent:

430. Sterilizing and preserving solutions.

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

§ 21.80 Formula No. 45.

(a) *Formula.* To every 100 gallons of alcohol add:

Three hundred pounds of refined white or orange shellac.

(b) *Authorized uses.* (1) As a solvent:

015. Candy glazes.

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

§ 21.81 Formula No. 46.

(a) *Formula.* To every 100 gallons of alcohol add:

Twenty-five fluid ounces of phenol, U.S.P., and 4 fluid ounces of methyl salicylate, N.F.

(b) *Authorized uses.* (1) As a solvent:

220. An antiseptic, sterilizing, and bathing solution having restricted use.

(2) Miscellaneous uses:

812. Product development and pilot plant uses (own use only).

(c) *Conditions governing use.* This formula may be used only by institutions and organizations which are of a semipublic character and engaged in charitable work.

Subpart E—Specifications for Denaturants

§ 21.91 General.

Denaturants prescribed in this part shall comply with the specifications set forth in this subpart. However, in order to meet requirements of national defense or for other valid reasons, the Director may, pursuant to written application filed by the denaturer, authorize variations from such specifications or authorize the use of substitute denaturants if such variation or substitution will not jeopardize the revenue. Each such application shall identify the applicant by name, address, and permit number; state the number of each formula of specially denatured alcohol involved; explain why the use of the substitute denaturant, or the variation from specifications, as the case may be, is necessary; and include, as applicable, either the identity of the approved denaturant for which substitution is desired and the identity of the substitute denaturant (including the name of the manufacturer) or the identity of the prescribed specifications and the proposed variation from those specifications. The application shall be accompanied by an 8-ounce sample of the proposed denaturing material for analysis.

§ 21.92 Denaturants listed as U.S.P. or N.F.

Denaturing materials and products listed in this part as “U.S.P.” or

“N.F.” shall meet the specifications set forth in the current United States Pharmacopoeia or National Formulary, or the latest volume of these publications in which the denaturants appeared as official preparations.

§ 21.93 Acetaldehyde.

(a) *Aldehyde content (as acetaldehyde).* Not less than 95.0 percent by weight.

(b) *Color.* Colorless.

(c) *Odor.* Characteristic pungent, fruity odor.

(d) *Specific gravity at 15.56 °/15.56 °C.* Not less than 0.7800.

§ 21.94 Acetaldol.

(a) *Purity.* Not less than 90 percent by weight acetaldol as determined by the following method:

Dissolve 15 grams of the acetaldol in distilled water and dilute to 1 liter in a volumetric flask. Transfer 5 ml of this solution to a 250 ml glass-stoppered flask containing 25 ml distilled water. Add 25 ml of a freshly prepared 1 percent sodium bisulfite solution. Prepare a blank omitting the acetaldol solution. Place the flasks in a dark place away from excessive heat or cold and allow to stand six hours. Remove flasks and titrate free bisulfite with 0.1 N iodine solution using starch indicator.

Percent acetaldol by weight = $(\text{ml blank} - \text{ml test}) \times 200 \times 0.44 / \text{weight of sample}$

Titration in excess of 100 percent may be obtained if the sample contains appreciable amounts of acetaldehyde.

(b) *Specific gravity at 20 °C.* 1.098 to 1.105.

§ 21.95 Ammonia, aqueous.

(a) *Alkalinity.* Strongly alkaline to litmus.

(b) *Ammonia content.* 27 to 30 percent by weight. Accurately weigh a glass-stoppered flask containing 25 ml of water, add about 2 ml of the sample, stopper, and weigh again. Add methyl red indicator, and titrate with 1 N sulfuric acid. Each ml of 1 N sulfuric acid is equivalent to 17.03 mg of NH_3 .

(c) *Color.* Colorless liquid.

(d) *Non-volatile residue.* 2 mg maximum. Dilute a portion of the sample with 1½ times its volume of distilled water. Evaporate 10 ml of this product to dryness in a tared platinum or porcelain dish. Dry residue at 105 °C. for 1 hour, cool and weigh.

(e) *Odor*. Characteristic (exceedingly pungent).

(f) *Specific gravity at 20 °/4 °C*. 0.8920 to 0.9010.

§ 21.96 Benzene.

(a) *Distillation range*. (For applicable ASTM method, see 1980 Annual Book of ASTM Standards, Part 29, page 573, Standard No. D 836-77; for incorporation by reference, see § 21.6(b).) When 100 ml of benzene are distilled by this method, not more than 1 ml should distill below 77 °C., and not less than 95 ml below 85 °C.

(b) *Odor*. Characteristic odor.

(c) *Specific gravity at 15.6 °/15.6 °C*. 0.875 to 0.886.

(d) *Water solubility*. When 10 ml of benzene are shaken with an equal volume of water in a glass-stoppered bottle, graduated to 0.1 ml, and allowed to stand 5 minutes to separate, the upper layer of liquid shall measure not less than 9.5 ml.

§ 21.97 Bone oil (Dipple's oil).

(a) *Color*. The color shall be a deep brown.

(b) *Distillation range*. When 100 ml are distilled in the manner described for pyridine bases, not more than 5.0 ml should distill below 90 °C.

(c) *Pyrol reaction*. Prepare a 1.0 percent solution of bone oil in 95 percent alcohol. Prepare a second solution containing 0.025 percent bone oil by diluting 2.50 ml of the first solution to 100 ml with 95 percent alcohol. Dip a splinter of pine, previously moistened with concentrated hydrochloric acid, into 10 ml of the 0.025 percent bone oil solution. After a few minutes the splinter should show a distinct red coloration.

(d) *Reaction with mercuric chloride*. Add 5 ml of the 1.0 percent bone oil solution above to 5 ml of a 2 percent alcoholic solution of mercuric chloride. A turbidity is formed at once which separates into a flocculent precipitate on standing several minutes. Add 5.0 ml of the 0.025 percent bone oil solution to 5.0 ml of a 2.0 percent alcoholic solution of mercuric chloride. A faint turbidity appears after several minutes.

§ 21.98 Brucine alkaloid.

(a) *Identification test*. Add a few drops of concentrated nitric acid to about 10

mg of brucine alkaloid. A vivid red color is produced. Dilute the red solution with a few drops of water and add a few drops of freshly made dilute stannous chloride solution. A reddish purple (violet) color is produced.

(b) *Melting point*. 178 °±1 °C. Dry the alkaloid in an oven for one hour at 100° C., increase the temperature to 110° and dry to a constant weight before taking melting point.

NOTE.—Brucine alkaloid tetrahydrate melts at 105 °C. while the anhydrous form melts at 178 °C.

(c) *Strychnine test*. Brucine alkaloid shall be free of strychnine when tested by the method listed under Brucine Sulfate, N.F. IX.

NOTE.—If the brucine contains as much as 0.05 percent strychnine, a clear distinctive violet color, characteristic of strychnine, will be obtained.

(d) *Sulfate test*. No white precipitate is formed that is not dissolved by hydrochloric acid when several drops of a 1 N barium chloride solution are added to 10 ml of a solution of the alkaloid.

§ 21.99 n-Butyl alcohol.

(a) *Acidity (as acetic acid)*. 0.03 percent by weight maximum.

(b) *Color*. Colorless.

(c) *Dryness at 20 °C*. Miscible without turbidity with 10 volumes of 60° Bé. gasoline.

(d) *Odor*. Characteristic odor.

(e) *Specific gravity at 20 °/20 °C*. 0.810 to 0.815.

§ 21.100 tert-Butyl alcohol.

(a) *Acidity (as acetic acid)*. 0.003 percent by weight maximum.

(b) *Color*. Colorless.

(c) *Distillation range*. When 100 ml of tertiary butyl alcohol are distilled, none should distill below 78 °C. and none above 85 °C. More than 95 percent should distill between 81 °–83 °C.

(d) *Dryness at 20 °C*. Miscible without turbidity with 19 volumes of 60° Bé. gasoline.

(e) *Freezing point (first needle)*. Above 20 °C.

(f) *Identification test*. Place five drops of a solution containing approximately 0.1 percent tertiary butyl alcohol in ethyl alcohol in a test tube. Add 2 ml of Denige's reagent (dissolve 5 grams of

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red mercuric oxide in 20 ml of concentrated sulfuric acid; add this solution to 80 ml of distilled water, and filter when cool). Heat the mixture just to the boiling point and remove from the flame. A yellow precipitate forms within a few seconds.

(g) *Nonvolatile matter*. Less than 0.005 percent by weight.

(h) *Odor*. Characteristic odor.

(i) *Residual odor after evaporation*. None.

(j) *Specific gravity at 25 °/25 °C*. 0.780 to 0.786.

§ 21.101 Caustic soda, liquid.

(a) The liquid caustic soda may consist of either 50 percent or 73 percent by weight sodium hydroxide in aqueous solution. The amount of caustic soda used shall be such that each 100 gallons of alcohol will contain not less than 8.76 pounds of sodium hydroxide, anhydrous basis.

(b) *Color*. A 2 percent solution of the sodium hydroxide in water shall be water-white.

(c) *Assay*. The sodium hydroxide content of the caustic soda solution shall be determined by the following procedure:

Accurately weigh 2 grams of liquid caustic soda into a 100 ml volumetric flask, dissolve, and dilute to the mark with distilled water at room temperature. Transfer a 25 ml aliquot of the solution to a titration flask, add 10 ml of 1 percent barium chloride solution, 0.2 ml of 1 percent phenolphthalein indicator, and 50 ml of distilled water. Titrate with 0.25 N hydrochloric acid to the disappearance of the pink color. Not less than 25 ml of the hydrochloric acid shall be required to neutralize the sample of diluted 50 percent caustic soda, and not less than 36.5 ml of the hydrochloric acid shall be required to neutralize the sample of diluted 73 percent caustic soda.

One ml of 0.25 N hydrochloric acid equals 0.01 gram of sodium hydroxide (anhydrous).

§ 21.102 Chloroform.

(a) *Odor*. Characteristic odor.

(b) *Specific gravity at 25 °/25 °C*. Not less than 1.400.

§ 21.103 Cinchonidine.

(a) *Melting point*. 208 ° to 210 °C.

(b) *Color*. White powder.

(c) *Taste*. Bitter.

(d) *Test*. A solution of cinchonidine in dilute sulfuric acid shall not have more

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than a faint blue fluorescence (to distinguish from quinine and quinidine).

§ 21.104 Citronella oil, natural.

(a) *Java type*:

(1) *Alcohol content (as Geraniol)*. Not less than 85 percent by weight.

(2) *Aldehyde content (as Citronellal)*. Not less than 30 percent by weight.

(3) *Refractive index at 20 °C*. 1.4660 to 1.4745.

(4) *Specific gravity at 25 °/25 °C*. 0.875 to 0.893.

(5) *Odor*. Characteristic odor.

(b) *Ceylon type*:

(1) *Alcohol content (as Geraniol)*. Not less than 55 percent by weight.

(2) *Aldehyde content (as Citronellal)*. Not less than 7 percent by weight.

(3) *Refractive index at 20 °C*. 1.4790 to 1.4850.

(4) *Specific gravity at 25 °/25 °C*. 0.891 to 0.904.

(5) *Odor*. Characteristic odor.

§ 21.105 Diethyl phthalate.

(a) *Refractive index at 25 °C*. 1.497 to 1.502.

(b) *Color*. Colorless.

(c) *Odor*. Practically odorless.

(d) *Solubility*. Soluble in 20 parts of 60 percent alcohol.

(e) *Specific gravity at 25 °/25 °C*. 1.115 to 1.118.

(f) *Ester content (as diethyl phthalate)*. Not less than 99 percent by weight.

NOTE.—The sample taken for ester determination should be approximately 0.8 gram. The number of ml of 0.5 N potassium hydroxide used in saponification multiplied by 0.05555 indicates the number of grams of ester in the sample taken for assay.

§ 21.106 Ethyl acetate.

(a) *85 percent ester*:

(1) *Acidity (as acetic acid)*. Not more than 0.015 percent by weight.

(2) *Color*. Colorless.

(3) *Odor*. Characteristic odor.

(4) *Ester content*. Not less than 85 percent by weight.

(5) *Specific gravity at 20 °/20 °C*. Not less than 0.882.

(6) *Distillation range*. (For applicable ASTM method, see 1980 Annual Book of ASTM Standards, Part 29, page 70, Standard No. D 302–58 (1975); for incorporation by reference, see § 21.6(b).)

When 100 ml of ethyl acetate are distilled by this method, none shall distill below 70 °C., not more than 10 ml shall distill below 72 °C., and none above 80 °C.

(b) *100 percent ester*:

(1) *Acidity (as acetic acid)*. Not more than 0.010 percent by weight.

(2) *Color*. Colorless.

(3) *Odor*. Characteristic odor.

(4) *Ester content*. Not less than 99 percent by weight.

(5) *Specific gravity at 20 °/20 °C*. Not less than 0.899.

(6) *Distillation range*. (For applicable ASTM method, see 1980 Annual Book of ASTM Standards, Part 29, page 433, Standard No. D 3127-77; for incorporation by reference, see §21.6(b).) When 100 ml of ethyl acetate are distilled by this method, not more than 2 ml shall distill below 75 °C., and none above 80 °C. (760 mm).

§ 21.107 Ethyl ether.

(a) *Odor*. Characteristic odor.

(b) *Specific gravity at 15.56 °/15.56 °C*. Not more than 0.728.

§ 21.108 Gasoline.

(a) *Distillation range*. When 100 ml of gasoline are distilled, none shall distill below 90 °F. Not more than 5 ml shall be collected below 140 °F., and not less than 50 ml shall distill below 230 °F.

(b) *Odor*. Characteristic odor.

§ 21.109 Gasoline, unleaded.

Conforms to specifications as established by the American Society for Testing and Materials (ASTM) in the 1980 Annual Book of ASTM Standards, Part 23, page 229, Standard No. D 439-79. Any of the "seasonal and geographical" volatility classes for unleaded gasoline are considered suitable as a denaturant. (For incorporation by reference, see §21.6(b).)

§ 21.110 Gentian violet.

(a) Gentian violet (methyl violet, methylrosaniline chloride) occurs as a dark green powder or crystals having metallic luster.

(b) *Arsenic content*. Not more than 15 ppm. (as As₂O₃) as determined by the applicable U.S.P. method.

(c) *Identification test*. Sprinkle about 1 mg of sample on 1 ml of sulfuric acid;

it dissolves in the acid with an orange or brown-red color. When this solution is diluted cautiously with water, the color changes to brown, then to green, and finally to blue.

(d) *Insoluble matter*. Not to exceed 0.25 percent when tested by the following method:

Transfer 1.0 gram of sample to a 150 ml beaker containing 50 ml of alcohol. Stir to complete solution and filter through a weighed Whatman No. 4 filter paper. Wash residue with small amounts of alcohol totaling about 50 ml. Dry paper in oven for 30 minutes at 80 °C. and weigh. Calculate insoluble material.

§ 21.111 Heptane.

(a) *Distillation range*. No distillate should come over below 200 °F. and none above 211 °F.

(b) *Odor*. Characteristic odor.

§ 21.112 Isopropyl alcohol.

Specific gravity at 15.56 °/15.56 °C. 0.810 maximum.

§ 21.113 Kerosene.

(a) *Distillation range*. (For applicable ASTM method, see 1980 Annual Book of ASTM Standards, Part 25, page 395, Standard No. D 3699-78 for burner fuel; see Part 23, page 849, Standard Nos. D 1655-80a for aviation turbine fuels and D 86-78 for distillation of petroleum products; for incorporation by reference, see §21.6(b).) No distillate should come over below 340 °F. and none above 570 °F.

(b) *Flash point*. 115 °F. minimum.

(c) *Odor*. Characteristic odor.

§ 21.114 Kerosene (deodorized).

(a) *Distillation range*. No distillate should come over below 340 °F. and none above 570 °F.

(b) *Flash point*. 155 °F. minimum.

§ 21.115 Methyl alcohol.

Specific gravity at 15.56 °/15.56 °C. 0.810 maximum.

§ 21.116 Methyl isobutyl ketone.

(a) *Acidity (as acetic acid)*. 0.02 percent by weight, maximum.

(b) *Color*. Colorless.

(c) *Distillation range*. (For applicable ASTM method, see 1980 Annual Book of

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ASTM Standards, Part 29, page 147, Standard No. D 1153-77; for incorporation by reference, see § 21.6(b).) No distillate should come over below 111 °C. and none above 117 °C.

(d) *Odor*. Characteristic odor.

(e) *Specific gravity at 20 °/20 °C*. 0.799 to 0.804.

§ 21.117 Methyl n-butyl ketone.

(a) *Acidity (as acetic acid)*. 0.02 percent by weight, maximum.

(b) *Color*. Colorless.

(c) *Odor*. Characteristic odor.

(d) *Refractive index at 20 °C*. 1.396 to 1.404.

(e) *Specific gravity at 20 °/20 °C*. 0.800 to 0.835.

(f) *Distillation range*. No distillate should come over below 123 °C. and none above 129 °C.

§ 21.118 Nicotine solution.

(a) *Composition*. Five gallons of an aqueous solution containing 40 percent nicotine; 3.6 avoirdupois ounces of methylene blue, U.S.P.; water sufficient to make 100 gallons.

(b) *Color*. One ml of the nicotine solution (previously agitated in the presence of air) is measured into 100 ml of water and thoroughly mixed. Fifty ml of this colored solution is compared, using Nessler tubes, with 50 ml of a standard color solution containing 5 grams of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, C.P. in 100 ml of water. The color intensity of the solution tested should be equal to or greater than that of the standard solution.

(c) *Nicotine content*. The above solution must contain not less than 1.88 percent of nicotine determined by the following process: 20 ml of the solution are measured into a 500 ml Kjeldahl flask provided with a suitable bulb tube, 50 ml of 0.1 N NaOH added and the mixture distilled in a current of steam until the distillate is no longer alkaline (about 500 ml). The distillate is then titrated with 0.1 N H_2SO_4 using rosolic acid or methyl red as indicator. Not less than 23.2 ml should be required for neutralization.

§ 21.119 Nitropropane, mixed isomers of.

(a) *Nitropropane content*. A minimum of 94 percent by weight.

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(b) *Total nitroparaffin content*. A minimum of 99 percent by weight.

(c) *Distillation range*. 119 ° to 113 °C.

(d) *Specific gravity at 20 °/20 °C*. 0.992 to 1.003.

§ 21.120 Phenyl mercuric benzoate.

(a) *Assay (as phenyl mercuric benzoate)*. Not less than 99.0 percent by weight.

(b) *Melting point*. Not less than 94 °C.

§ 21.121 Pyridine bases.

(a) *Alkalinity*. One ml of pyridine bases dissolved in 10 ml of water is titrated with 1 N H_2SO_4 until a drop of the mixture placed upon Congo paper shows a distinct blue border, which soon disappears. A minimum of 9.5 ml of the acid must be required for the end point. (Congo paper: filter paper treated with 0.1 percent aqueous solution of Congo red and dried.)

(b) *Distillation range*. One hundred ml of the denaturant are distilled in the following manner: The sample is placed in a short-necked glass flask of about 200 ml capacity which is rested on an asbestos plate having a circular opening of 30 mm in diameter. The neck of this flask is fitted with a fractionating tube 12 mm in diameter and 170 mm long and having a bulb just 1 cm below the side tube which is connected with a Liebig condenser having a water jacket not less than 400 mm in length. A standardized thermometer is placed in the fractionating tube so that the mercury bulb is suspended in the center of the fractionating bulb. Heat is applied slowly and in such manner that 5 ml of distillate is collected per minute in a graduated cylinder. At least 50 ml must distill at or below 140 °C. and at least 90 ml below 160 °C.

(c) *Reactions*. Dissolve 1 ml of pyridine bases in 100 ml of water.

(1) Ten ml of this solution are treated with 5 ml of 5 percent aqueous solution of anhydrous fused CaCl_2 and the mixture vigorously shaken. An abundant crystalline separation should occur within 10 minutes.

(2) Ten ml of the pyridine solution mixed with 50 ml of Nessler's reagent must give a white precipitate.

(d) *Water content*. Twenty ml of pyridine bases are shaken with 20 ml of a caustic soda solution having a specific

gravity of 1.40 (15.56 °/15.56 °C.) and the mixture allowed to stand until completely separated into two layers. The amount of pyridine base layer should be 18.5 ml, minimum.

§21.122 Pyronate.

Pyronate is a product of the destructive distillation of hardwood meeting the following requirements:

(a) *Acidity (as acetic acid)*. Not more than 0.1 percent by weight, determined as follows:

Add 5.0 ml sample to 100 ml distilled water in an Erlenmeyer flask and titrate with 0.1 N NaOH to a bromthymol blue endpoint.

(b) *Color*. The color shall be no darker than the color produced by 2.0 grams of potassium dichromate in 1 liter of water. The comparison shall be made in 4-ounce oil sample bottles viewed crosswise.

(c) *Distillation range*. When 100 ml are distilled not more than 5 ml shall distill below 70 °C., not less than 50 ml below 160 °C., and not less than 90 ml below 205 °C.

NOTE.—Any material submitted as pyronate must agree in color, odor, taste and denaturing value with a standard sample furnished by the Bureau of Alcohol, Tobacco and Firearms to chemists authorized to examine samples of denaturants.

§21.123 Quassin.

(a) Quassin is the bitter principle of quassia wood (occurring as a mixture of two isomeric forms). It shall be a good commercial grade of purified amorphous quassin, standardized as to bitterness.

(b) *Bitterness*. An aqueous solution of quassin shall be distinctly bitter at a 1 to 250,000 dilution. To test: Dissolve 0.1 gram of quassin in 100 ml of 95 percent alcohol, then dilute 4 ml of the solution to 1,000 ml with distilled water, mix well and taste.

(c) *Identification test*. Dissolve about 0.5 gram of quassin in 10 ml of 95 percent alcohol and filter. To 5 ml of the filtrate, add 5 ml of concentrated hydrochloric acid and 1 mg of phloroglucinol and mix well. A red color develops.

(d) *Optical assay*. When 1 gram of quassin (in solution in a small amount of 95 percent alcohol) is dissolved in

10,000 ml of water, the absorbance of the solution in a 1 cm cell at a wavelength of 258 millimicrons shall not be less than 0.400.

(e) *Solubility*. When 0.5 gram of quassin is added to 25 ml of 190 proof alcohol, it shall dissolve completely.

§21.124 Rubber hydrocarbon solvent.

(a) Rubber hydrocarbon solvent is a petroleum derivative.

(b) *Distillation range*. When 10 percent of the sample has been distilled into a graduated receiver, the thermometer shall not read more than 170 °F. nor less than 90 °F. When 90 percent has been recovered in the receiver the thermometer shall not read more than 250 °F.

§21.125 Saffrole.

(a) *Congealing point*. 10.0 ° to 11.2 °C.

(b) *Refractive index at 20 °C*. 1.5363 to 1.5385.

(c) *Specific gravity at 15 °/15 °C*. 1.100 to 1.107.

(d) *Odor*. Characteristic odor.

§21.126 Shellac (refined).

(a) *Arsenic content*. Not more than 1.4 parts per million as determined by the Gutzeit Method (AOAC method 25.020; for incorporation by reference, see §21.6(c)).

(b) *Color*. White or orange.

(c) *Rosin content*. None when tested by the following method: Add 20 ml of absolute alcohol or glacial acetic acid (m. p. 13 ° to 15 °C.) to 2 grams of the shellac and thoroughly dissolve. Add 100 ml of petroleum ether and mix thoroughly. Add approximately 2 liters of water and separate a portion of the ether layer (at least 50 ml) and filter if cloudy. Evaporate the petroleum ether and test as follows: Solution A—5 ml of phenol dissolved in 10 ml of carbon tetrachloride. Solution B—1 ml of bromine dissolved in 4 ml of carbon tetrachloride. To the residue obtained above add 2 ml of Solution A and transfer the mixture to a porcelain spot plate, filling one cavity. Immediately fill an adjacent cavity with solution B. Cover the plate with a watch glass and observe any color formation in Solution A. A decided purple or deep indigo blue color is an indication of the presence of rosin.

§ 21.127 Sodium (metallic).

(a) *Color.* Silvery-white (metallic luster) when freshly cut.

(b) *Identification test.* Clean a platinum wire by dipping it in concentrated hydrochloric acid and holding it over a Bunsen burner until the flame is no longer colored. Moisten the wire loop with hydrochloric acid and dip it into the sample. Hold the wire in the Bunsen flame and note the color. Sodium produces a golden yellow flame; not observed when viewed through a cobalt glass.

(c) *Purity.* Technical grade or better.

§ 21.128 Spearmint oil, terpeneless.

(a) *Carvone content.* Not less than 85 percent by weight.

(b) *Refractive index at 20 °C.* 1.4930 to 1.4980.

(c) *Specific gravity at 25 °/25 °C.* 0.949 to 0.956.

(d) *Odor.* Characteristic odor.

§ 21.129 Spike lavender oil, natural.

(a) *Alcohol content (as borneol).* Not less than 30 percent by weight.

(b) *Esters (as bornyl acetate).* Not less than 1.5 percent by weight.

(c) *Refractive index at 20 °C.* 1.4630 to 1.4680.

(d) *Specific gravity at 25 °/25 °C.* 0.893 to 0.909.

(e) *Odor.* Characteristic odor.

§ 21.130 Sucrose octaacetate.

(a) Sucrose octaacetate is an organic acetylation product occurring as a white or cream-colored powder having an intensely bitter taste.

(b) *Free acid (as acetic acid).* Maximum percentage 0.15 by weight when determined by the following procedure: Dissolve 1.0 gram of sample in 50 ml of neutralized ethyl alcohol (or S.D.A. No. 3-A, No. 3-C, or No. 30) and titrate with 0.1 N sodium hydroxide using phenolphthalein indicator.

Percent acid as acetic acid = $\frac{\text{ml NaOH used} \times 0.6}{\text{weight of sample}}$

(c) *Insoluble matter.* 0.30 percent by weight maximum.

(d) *Melting point.* Not less than 78.0 °C.

(e) *Purity.* Sucrose octaacetate 98 percent minimum by weight when determined by the following procedure:

Transfer a weighed 1.50 grams sample to a 500 ml Erlenmeyer flask containing 100 ml of neutral ethyl alcohol (or S.D.A. No. 3-A, No. 3-C, or No. 30) and exactly 50.0 ml of 0.5 N sodium hydroxide. Reflux for 1 hour on a steam bath, cool and titrate the excess sodium hydroxide with 0.5 N sulfuric acid using phenolphthalein indicator.

Percent sucrose octaacetate = $\frac{\text{ml NaOH} - \text{ml H}_2\text{SO}_4 \times 4.2412}{\text{weight of sample}}$

§ 21.131 Toluene.

(a) *Distillation range.* (For applicable ASTM method, see 1980 Annual Book of ASTM Standards, Part 29, page 569, Standard No. D 362-75 for industrial grade toluene; for incorporation by reference, see § 21.6(b).) When 100 ml of toluene are distilled by this method, not more than 1 ml should distill below 109 °C., and not less than 99 ml below 112 °C.

(b) *Boiling point.* 110.6 °±1 °C.

(c) *Odor.* Characteristic odor.

(d) *Specific gravity at 15.56 °/15.56 °C.* 0.869 to 0.873.

§ 21.132 Vinegar.

(a) *Vinegar, 90-grain:*

Acidity (as acetic acid). 9.0 percent by weight, minimum.

(b) *Vinegar, 60-grain:*

Acidity (as acetic acid). 6.0 percent by weight, minimum.

Subpart F—Uses of Specially Denatured Alcohol and Specially Denatured Rum

§ 21.141 List of products and processes using specially denatured alcohol and rum, and formulas authorized therefor.

This section lists, alphabetically by product or process, formulas of specially denatured alcohol authorized for use in those products or processes, and lists the code numbers assigned thereto. Specially denatured rum, as well as specially denatured alcohol, may be used in tobacco sprays and flavors, Code No. 460, under Formula No. 4.

USES OF SPECIALLY DENATURED ALCOHOL ¹

Product or process	Code No.	Formulas authorized
Acetaldehyde	551	1, 2-B, 29.

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USES OF SPECIALLY DENATURED ALCOHOL ¹—
Continued

Product or process	Code No.	Formulas authorized
Acetic acid	512	29, 35-A.
Adhesives and binders	036	1, 3-A, 3-C, 12-A, 23-A, 30.
Aldehydes, miscellaneous	552	1, 2-B, 29.
Alkaloids (processing) ..	344	1, 2-B, 2-C, 3-A, 3-C, 12-A, 13-A, 17, 23-A, 30, 32, 35-A.
Animal feed supplements	910	35-A.
Antibiotics (processing) ..	343	1, 2-B, 3-A, 3-C, 12-A, 13-A, 23-A, 30, 32, 35-A.
Antifreeze, proprietary ..	760	1.
Antiseptic, bathing solution (restricted) ..	220	46.
Antiseptic solutions, U.S.P. or N.F.	244	23-A, 37, 38-B, 38-F.
Bath preparations	142	1, 3-A, 3-B, 3-C, 23-A, 30, 36, 38-B, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Bay rum	112	23-A, 37, 38-B, 39, 39-B, 39-D, 40, 40-A, 40-B, 40-C.
Biocides, miscellaneous ..	410	1, 3-A, 3-B, 3-C, 23-A, 23-H, 27-A, 27-B, 30, 37, 38-B, 39-B, 40, 40-A, 40-B, 40-C.
Blood and blood products (processing) ..	345	1, 3-A, 3-C, 12-A, 13-A, 23-A, 30.
Brake fluids	720	1, 3-A, 3-C.
Candy glazes	015	13-A, 23-A, 35, 35-A, 45.
Cellulose coatings	011	1, 3-A, 3-C, 23-A, 30.
Cellulose compounds (dehydration) ..	311	1, 2-B, 3-A, 3-C, 32.
Cellulose intermediates ..	034	1, 3-A, 3-C, 13-A, 19, 23-A, 32.
Chemicals (miscellaneous) ..	579	1, 2-B, 2-C, 3-A, 3-C, 6-B, 12-A, 13-A, 17, 20, 29, 30, 32, 36.
Cleaning solutions	450	1, 3-A, 3-C, 23-A, 23-H, 30, 36, 39-B, 40, 40-A, 40-B, 40-C.
Coatings, miscellaneous ..	016	1, 3-A, 3-C, 23-A.
Collodions, industrial	034	1, 3-A, 3-C, 13-A, 19, 23-A, 32.
Collodion, U.S.P.	241	13-A, 19, 32.
Colognes	122	38-B, 39, 39-A, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Crude drugs (processing) ..	341	1, 2-B, 3-A, 3-C, 23-A, 30.
Cutting oils	730	1, 3-A, 3-C.
Dehydration products, miscellaneous ..	315	1, 2-B, 3-A, 3-C.
Dentifrices	131	31-A, 37, 38-B, 38-C, 38-D.
Deodorants (body)	114	23-A, 38-B, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Detergents, household ..	450	1, 3-A, 3-C, 23-A, 23-H, 30, 36, 39-B, 40, 40-A, 40-B, 40-C.
Detergents, industrial ...	440	1, 3-A, 3-C, 23-A, 30.
Detonators	574	1, 6-B.
Disinfectants	410	1, 3-A, 3-B, 3-C, 23-A, 23-H, 27-A, 27-B, 30, 37, 38-B, 39-B, 40, 40-A, 40-B, 40-C.

USES OF SPECIALLY DENATURED ALCOHOL ¹—
Continued

Product or process	Code No.	Formulas authorized
Drugs and medicinal chemicals ..	575	1, 2-B, 2-C, 3-A, 3-C, 6-B, 12-A, 13-A, 17, 29, 30, 32.
Drugs, miscellaneous (processing) ..	349	1, 2-B, 3-A, 3-C, 13-A, 23-A, 30, 35-A, 38-B.
Duplicating fluids	485	1, 3-A, 3-C, 30.
Dyes and intermediates ..	540	1, 2-B, 2-C, 3-A, 3-C, 12-A, 29, 36.
Dyes and intermediates (processing) ..	351	1, 2-B, 3-A, 3-C, 12-A.
Dye solutions, miscellaneous ..	482	1, 3-A, 3-C, 23-A, 30.
Embalming fluids, etc ...	420	1, 3-A, 3-C, 22, 23-A.
Esters, ethyl (miscellaneous) ..	523	1, 2-B, 2-C, 6-B, 12-A, 13-A, 29, 32, 35-A.
Ether, ethyl	561	1, 2-B, 13-A, 29, 32.
Ethers, miscellaneous ..	562	1, 2-B, 13-A, 29, 32.
Ethyl acetate	521	1, 2-B, 29, 35-A.
Ethylamines	530	1, 2-B, 2-C, 3-A, 3-C, 12-A, 29, 36.
Ethyl chloride	522	1, 2-B, 29, 32.
Ethylene dibromide	571	1, 2-B, 29, 32.
Ethylene gas	572	1, 2-B, 29, 32.
Explosives	033	1, 2-B, 3-A, 3-C.
External pharmaceuticals, not U.S.P. or N.F.	210	23-A, 23-F, 23-H, 27, 27-A, 27-B, 33, 36, 37, 38-B, 38-F, 39-B, 40, 40-A, 40-B, 40-C.
External pharmaceuticals, miscellaneous, U.S.P. or N.F.	249	23-A, 25, 25-A, 33, 38-B.
Fluid uses, miscellaneous ..	750	1, 3-A, 3-C, 23-A, 30.
Food products, miscellaneous (processing) ..	332	1, 2-B, 3-A, 3-C, 13-A, 23-A, 30, 32, 35-A.
Fuel uses, miscellaneous ..	630	1, 3-A, 3-C, 28-A.
Fuels, airplane and supplementary ..	612	1, 3-A, 3-C, 28-A.
Fuels, automobile and supplementary ..	611	1, 3-A, 3-C, 28-A.
Fuels, proprietary heating ..	620	1, 3-A, 3-C, 28-A.
Fuels, rocket and jet	613	1, 3-A, 3-C, 28-A.
Fungicides	410	1, 3-A, 3-B, 3-C, 23-A, 23-H, 27-A, 27-B, 30, 37, 38-B, 39-B, 40, 40-A, 40-B, 40-C.
Glandular products (processing) ..	342	1, 2-B, 3-A, 3-C, 12-A, 13-A, 23-A, 30, 32, 35-A.
Hair and scalp preparations ..	111	3-B, 23-A, 23-F, 23-H, 37, 38-B, 39, 39-A, 39-B, 39-C, 39-D, 40, 40-A, 40-B, 40-C.
Hormones (processing) ..	342	1, 2-B, 3-A, 3-C, 12-A, 13-A, 23-A, 30, 32, 35-A.
Incense	470	3-A, 3-C, 22, 37, 38-B, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Inks	052	1, 3-A, 3-C, 13-A, 23-A, 30, 32, 33.
Insecticides	410	1, 3-A, 3-B, 3-C, 23-A, 23-H, 27-A, 27-B, 30, 37, 38-B, 39-B, 40, 40-A, 40-B, 40-C.

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USES OF SPECIALLY DENATURED ALCOHOL ¹—
Continued

Product or process	Code No.	Formulas authorized
Iodine solutions (including U.S.P. and N.F. tinctures).	230	25, 25-A.
Laboratory reagents (for sale).	811	3-A, 3-C, 30.
Laboratory uses, general (own use only).	810	3-A, 3-C, 30.
Lacquer thinners	042	1, 23-A.
Liniments, U.S.P. or N.F.	243	27, 27-B, 38-B.
Lotions and creams (body, face, and hand).	113	23-A, 23-H, 31-A, 37, 38-B, 39, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Medicinal chemicals (processing).	344	1, 2-B, 2-C, 3-A, 3-C, 12-A, 13-A, 17, 23-A, 30, 32, 35-A.
Miscellaneous chemicals (processing).	358	1, 2-B, 2-C, 3-A, 3-C, 12-A, 13-A, 17, 23-A, 30, 35-A.
Miscellaneous products (processing).	359	1, 2-B, 2-C, 3-A, 3-C, 12-A, 13-A, 17, 23-A, 30, 35-A.
Mouth washes	132	37, 38-B, 38-C, 38-D, 38-F.
Organo-silicone products.	576	2-B, 3-A, 3-C, 30.
Pectin (processing)	331	1, 2-B, 3-A, 3-C, 13-A, 23-A, 30, 35-A.
Perfume materials (processing).	352	1, 2-B, 3-A, 3-C, 12-A, 13-A, 30.
Perfumes and perfume tinctures.	121	38-B, 39, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Petroleum products	320	1, 2-B, 3-A, 3-C.
Photoengraving dyes and solutions.	481	1, 3-A, 3-C, 13-A, 30, 32.
Photographic chemicals (processing).	353	1, 2-B, 3-A, 3-C, 13-A, 30.
Photographic film and emulsions.	031	1, 2-B, 3-A, 3-C, 13-A, 19, 30, 32.
Pill and tablet manufacture.	349	1, 2-B, 3-A, 3-C, 13-A, 23-A, 30, 35-A, 38-B.
Plastics, cellulose	021	1, 2-B, 3-A, 3-C, 12-A, 13-A, 30.
Plastics, non-cellulose (including resins).	022	1, 2-B, 3-A, 3-C, 12-A, 13-A, 30.
Polishes	051	1, 3-A, 3-C, 30.
Preserving solutions	430	1, 3-A, 3-C, 12-A, 13-A, 22, 23-A, 30, 32, 37, 38-B, 42, 44.
Product development and pilot plant (own use only).	812	All formulas.
Proprietary solvents	041	1, 3-A.
Refrigerating uses	740	1, 3-A, 3-C, 23-A, 30.
Resin coatings, natural	014	1, 23-A.
Resin coatings, synthetic.	012	1, 3-A, 3-C, 23-A, 30.
Resins, synthetic	590	3-A, 3-C, 29, 30, 35-A.
Room deodorants	470	3-A, 3-C, 22, 37, 38-B, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Rosin (processing)	354	1, 3-A, 3-C, 12-A.
Rotogravure dyes and solutions.	481	1, 3-A, 3-C, 13-A, 30, 32.
Rubber (latex) (processing).	355	1, 3-A, 3-C.
Rubber, synthetic	580	29, 32.
Rubbing alcohol	220	23-H.
Scientific instruments ...	710	1, 3-A, 3-C.

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USES OF SPECIALLY DENATURED ALCOHOL ¹—
Continued

Product or process	Code No.	Formulas authorized
Shampoos	141	1, 3-A, 3-B, 3-C, 23-A, 27-B, 31-A, 36, 38-B, 39-A, 39-B, 40, 40-A, 40-B, 40-C.
Shellac coatings	013	1, 23-A.
Soaps, industrial	440	1, 3-A, 3-C, 23-A, 30.
Soaps, toilet	142	1, 3-A, 3-C, 23-A, 30, 36, 38-B, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Sodium ethylate, anhydrous (restricted).	524	2-B.
Sodium hydrosulfite (dehydration).	312	1, 2-B, 3-A, 3-C.
Soldering flux	035	1, 3-A, 3-C, 23-A, 30.
Solutions, miscellaneous.	485	1, 3-A, 3-C, 23-A, 30, 40-C.
Solvents and thinners (other than proprietary solvents or special industrial solvents).	042	1, 23-A, 30.
Solvents, special (restricted sale).	043	1, 3-A, 3-C.
Stains (wood)	053	1, 3-A, 3-C, 23-A, 30.
Sterilizing solutions	430	1, 3-A, 3-C, 12-A, 13-A, 22, 23-A, 30, 32, 37, 38-B, 42, 44.
Theater sprays	470	3-A, 3-C, 22, 37, 38-B, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Tobacco sprays and flavors.	460	4.
Toilet waters	122	38-B, 39, 39-A, 39-B, 39-C, 40, 40-A, 40-B, 40-C.
Transparent sheetings ..	032	1, 2-B, 3-A, 3-C, 13-A, 23-A.
Unclassified uses ²	900	1, 3-A, 3-C.
Vaccine (processing)	343	1, 2-B, 3-A, 3-C, 12-A, 13-A, 23-A, 30, 32, 35-A.
Vinegar	511	18, 29, 35-A.
Vitamins (processing) ...	342	1, 2-B, 3-A, 3-C, 12-A, 13-A, 23-A, 30, 32, 35-A.
Xanthates	573	1, 2-B, 29.
Yeast (processing)	342	1, 2-B, 3-A, 3-C, 12-A, 13-A, 23-A, 30, 32, 35-A.

¹ Other products or processes may be authorized by the Chief, Chemical Branch, under § 21.31(c).

² Persons desiring other formulas for this use should indicate the fact in the space provided for this purpose on ATF Form 5150.19.

[T.D. ATF-133, 48 FR 24673, June 2, 1983, as amended by T.D. ATF-199, 50 FR 9183, Mar. 6, 1985]

**Subpart G—Denaturants
Authorized for Denatured Spirits**

§ 21.151 List of denaturants authorized for denatured spirits.

Following is an alphabetical listing of denaturants authorized for use in denatured spirits:

Bureau of Alcohol, Tobacco and Firearms, Treasury

§ 21.161

Denaturants Authorized for Completely Denatured Alcohol (C.D.A.), Specially Denatured Alcohol (S.D.A.), and Specially Denatured Rum (S.D.R.)

Denaturants Authorized for Completely Denatured Alcohol (C.D.A.), Specially Denatured Alcohol (S.D.A.), and Specially Denatured Rum (S.D.R.)—Continued

Acetaldehyde	S.D.A. 29.
Acetone, U.S.P	S.D.A. 23–A, 23–H.
Acetaldol	C.D.A. 18.
Almond oil, bitter, N.F.X	S.D.A. 38–B.
Ammonia, aqueous	S.D.A. 36.
Ammonia solution, strong, N.F	S.D.A. 36.
Anethole, N.F	S.D.A. 38–B.
Anise oil, N.F	S.D.A. 38–B.
Bay oil (myrcia oil), N.F.XI	S.D.A. 23–F, 38–B, 39–D.
Benzaldehyde, N.F	S.D.A. 38–B.
Benzene	S.D.A. 2–B, 2–C, 12–A.
Bergamot oil, N.F.XI	S.D.A. 23–F, 38–B.
Bone oil (Dipple's oil)	S.D.A. 17.
Boric acid, N.F	S.D.A. 38–F.
Brucine alkaloid	S.D.A. 40.
Brucine sulfate, N.F.IX	S.D.A. 40.
<i>n</i> -Butyl alcohol	S.D.A. 44.
<i>tert</i> -Butyl alcohol	S.D.A. 39, 39–A, 39–B, 40, 40–A, 40–B, 40–C.
Camphor, U.S.P	S.D.A. 27, 27–A, 38–B.
Caustic soda, liquid	S.D.A. 36.
Cedar leaf oil, U.S.P.XIII	S.D.A. 38–B.
Chloroform	S.D.A. 20.
Chlorothymol, N.F.XII	S.D.A. 38–B, 38–F.
Cinchonidine	S.D.A. 39–A.
Cinchonidine sulfate, N.F.IX	S.D.A. 39–A.
Cinnamic aldehyde (cinnamaldehyde), N.F.IX.	S.D.A. 38–B.
Cinnamon oil, N.F	S.D.A. 38–B.
Citronella oil, natural	S.D.A. 27–A, 38–B.
Clove oil, N.F	S.D.A. 38–B.
Coal tar, U.S.P	S.D.A. 1, 40–B.
Denatonium benzoate, N.F. (BITREX).	S.D.A. 39–B, 39–C.
Diethyl phthalate	S.D.A. 29, 35, 35–A.
Ethyl acetate	S.D.A. 13–A, 19, 32.
Ethyl ether	S.D.A. 37, 38–B.
Eucalyptol, N.F.XII	S.D.A. 38–B.
Eucalyptus oil, N.F	S.D.A. 38–B.
Eugenol, U.S.P	S.D.A. 22, 38–C, 38–D.
Formaldehyde solution, U.S.P	C.D.A. 18, 19; S.D.A. 28–A.
Gasoline	C.D.A. 18, 19, 20; S.D.A. 28–A.
Gasoline, unleaded	S.D.A. 33.
Gentian violet	S.D.A. 33.
Gentian violet, U.S.P	S.D.A. 31–A.
Glycerin (Glycerol), U.S.P	S.D.A. 27–B.
Green soap, U.S.P	S.D.A. 38–B.
Guaiacol, N.F.X	C.D.A. 18, 19; S.D.A. 28–A.
Heptane	S.D.A. 38–F.
Hydrochloric acid, N.F	S.D.A. 25, 25–A.
Iodine, U.S.P	S.D.A. 3–C.
Isopropyl alcohol	C.D.A. 18, 19, 20.
Kerosene	C.D.A. 18, 19, 20.
Kerosene (deodorized)	S.D.A. 27–B, 38–B.
Lavender oil, N.F	S.D.A. 37, 38–B, 38–C, 38–D, 38–F.
Menthol, U.S.P	S.D.A. 42.
Mercuric iodide, red, N.F.XI	S.D.A. 1, 3–A, 30.
Methyl alcohol	S.D.A. 4; S.D.R. 4.
Methylene blue, U.S.P	C.D.A. 18, 19; S.D.A. 1, 23–H.
Methyl isobutyl ketone	C.D.A. 18, 19; S.D.A. 1.
Methyl <i>n</i> -butyl ketone	S.D.A. 38–B, 46.
Methyl salicylate, N.F	S.D.A. 38–B.
Mustard oil, volatile (allyl isothiocyanate), U.S.P.XII.	

Nicotine solution	S.D.A. 4; S.D.R. 4.
Nitropropane, mixed isomers of	C.D.A. 18, 19; S.D.A. 1.
Peppermint oil, N.F	S.D.A. 38–B.
Phenol, U.S.P	S.D.A. 38–B, 46.
Phenyl mercuric benzoate	S.D.A. 42.
Phenyl mercuric chloride, N.F.IX	S.D.A. 42.
Phenyl mercuric nitrate, N.F	S.D.A. 42.
Phenyl salicylate (salol), N.F.XI	S.D.A. 38–B.
Pine needle oil, dwarf, N.F	S.D.A. 38–B.
Pine oil, N.F	S.D.A. 38–B.
Pine tar, U.S.P	S.D.A. 3–B.
Polysorbate 80, N.F	S.D.A. 38–F.
Potassium iodide, U.S.P	S.D.A. 25, 25–A, 42.
Pyridine bases	S.D.A. 6–B.
Pyronate	C.D.A. 18.
Quassia, fluid extract, N.F.VII	S.D.A. 39.
Quassin	S.D.A. 40.
Quinine, N.F.X	S.D.A. 39–A.
Quinine bisulfate, N.F.XI	S.D.A. 39–A, 39–D.
Quinine dihydrochloride, N.F.XI	S.D.A. 39–A.
Quinine sulfate, U.S.P	S.D.A. 39–D.
Resorcinol (Resorcin), U.S.P	S.D.A. 23–F.
Rosemary oil, N.F. XII	S.D.A. 27, 38–B.
Rubber hydrocarbon solvent	C.D.A. 18, 19, 20; S.D.A. 2–B, 2–C, 28–A.
Safrole	S.D.A. 38–B.
Salicylic acid, U.S.P	S.D.A. 23–F, 39.
Sassafras oil, N.F.XI	S.D.A. 38–B.
Shellac (refined)	S.D.A. 45.
Soap, hard, N.F.XI	S.D.A. 31–A.
Sodium iodide, U.S.P	S.D.A. 25, 25–A.
Sodium, metallic	S.D.A. 2–C.
Sodium salicylate, U.S.P	S.D.A. 39, 39–D.
Spearmint oil, N.F	S.D.A. 38–B.
Spearmint oil, terpeneless	S.D.A. 38–B.
Spike lavender oil, natural	S.D.A. 38–B.
Storax, U.S.P	S.D.A. 38–B.
Sucrose octaacetate	S.D.A. 40–A.
Thimerosal, U.S.P	S.D.A. 42.
Thyme oil, N.F.XII	S.D.A. 38–B.
Thymol, N.F	S.D.A. 37, 38–B, 38–F.
Tolu balsam, U.S.P	S.D.A. 38–B.
Toluene	S.D.A. 2–B, 2–C, 12–A.
Turpentine oil, N.F.XI	S.D.A. 38–B.
Vinegar	S.D.A. 18.
Zinc chloride, U.S.P	S.D.A. 38–F.

Subpart H—Weights and Specific Gravities of Specially Denatured Alcohol

§21.161 Weights and specific gravities of specially denatured alcohol.

The weight of one gallon of each formula of specially denatured alcohol at 15.56 °C. (60 °F.) is as listed in this section. The specific gravity of each formula of specially denatured alcohol at 15.56 °C./15.56 °C. (60 °F./60 °F.) in air is as listed in this section. (Weight of 1 gallon of water at 15.56 °C. (60 °F.) is 8.32823 pounds in air.)

WEIGHTS AND SPECIFIC GRAVITIES OF SPECIALLY DENATURED ALCOHOL ¹

[Slight deviations from this table may occur due to variations in specific gravities of authorized denaturants. Values for 190 proof determined experimentally in air. Other values calculated from these gravities.]

S.D.A. Formula No.	Finished formula (gals)	190 proof		192 proof		200 proof	
		Wt./gal. in air (lbs)	Sp. gr. in air	Wt./gal. in air (lbs)	Sp. gr. in air	Wt./gal. in air (lbs)	Sp. gr. in air
1	104.0	6.788	0.8151	6.756	0.8112	6.611	0.7938
2-B	100.5	6.795	.8159	6.762	.8119	6.612	.7939
2-C	99.5	6.959	.8356
3-A	105.0	6.787	.8149	6.755	.8111	6.611	.7938
3-B	101.0	6.810	.8177	6.777	.8137	6.627	.7957
3-C	105.0	6.784	.8146	6.752	.8107	6.608	.7935
4	100.8	6.823	.8193	6.791	.8154	6.640	.7973
6-B	100.5	6.801	.8166	6.768	.8127	6.618	.7947
12-A	105.0	6.820	.8189	6.789	.8152	6.645	.7979
13-A	109.7	6.740	.8093	6.710	.8057	6.572	.7891
17	100.05	6.795	.8159	6.762	.8119	6.611	.7938
18	195.4	7.802	.9368	7.785	.9348	7.708	.9255
19	197.9	6.468	.7766	6.452	.7747	6.375	.7655
20	104.9	7.062	.8480	7.030	.8441	6.886	.8268
22	109.5	7.037	.8450	7.007	.8414	6.868	.8247
23-A	107.9	6.788	.8151	6.758	.8115	6.619	.7948
23-F	101.5	6.808	.8175	6.776	.8136	6.627	.7957
23-H	109.45	6.785	.8147	6.755	.8111	6.617	.7945
25	100.9	7.080	.8501	7.047	.8462	6.897	.8282
25 ²	100.9	7.083	.8505	7.050	.8465	6.900	.8285
25-A	102.5	7.119	.8548	7.087	.8510	6.939	.8332
25-A ²	102.5	7.117	.8546	7.085	.8507	6.938	.8331
27	104.7	6.846	.8220	6.814	.8182	6.670	.8009
27-A	105.2	6.867	.8245	6.835	.8207	6.692	.8035
27-B	112.0	7.027	.8438	6.998	.8403	6.862	.8239
28-A	101.0	6.786	.8148	6.753	.8109	6.603	.7929
29	100.76	6.808	.8175	6.775	.8135	6.624	.7954
30	110.0	6.785	.8147	6.755	.8111	6.617	.7945
31-A	111.5	7.167	.8606	7.138	.8571	7.002	.8408
32	104.8	6.769	.8128	6.737	.8089	6.593	.7916
33	102.9	6.893	.8277	6.861	.8238	6.714	.8062
35 ³	135.0	6.956	.8352	6.933	.8325	6.820	.8189
35 ⁴	129.75	6.963	.8361	6.937	.8330	6.820	.8189
35-A ³	105.0	6.817	.8185	6.785	.8147	6.641	.7974
35-A ⁴	104.25	6.826	.8196	6.794	.8158	6.649	.7984
36	102.7	6.837	.8209	6.804	.8170	6.657	.7993
37	100.9	6.794	.8158	6.762	.8119	6.612	.7939
38-B	101.3	6.804	.8170	6.772	.8131	6.622	.7951
38-C	102.6	6.832	.8203	6.800	.8165	6.652	.7987
38-D	102.7	6.863	.8241	6.830	.8201	6.682	.8023
38-F	100.9	6.828	.8199	6.796	.8160	6.646	.7980
39	102.0	6.867	.8245	6.834	.8206	6.686	.8028
39-A	100.5	6.810	.8177	6.777	.8137	6.627	.7957
39-B	102.7	6.857	.8233	6.825	.8195	6.677	.8017
39-C	101.0	6.819	.8188	6.792	.8155	6.642	.7975
39-D	101.3	6.819	.8188	6.787	.8149	6.637	.7969
40	100.1	6.795	.8159	6.762	.8119	6.611	.7938
40-A	100.2	6.798	.8163	6.765	.8123	6.613	.7941
40-B	100.1	6.794	.8158	6.761	.8118	6.610	.7937
40-C	103.0	6.788	.8151	6.756	.8112	6.609	.7936
42	100.0	6.797	.8161	6.764	.8122	6.613	.7941
44	110.0	6.790	.8153	6.760	.8117	6.622	.7951
45	129.8	7.545	.9060	7.520	.9030	7.403	.8889
46	100.1	6.805	.8171	6.772	.8131	6.621	.7950

¹ Where alternate denaturants are permitted, the above weights are based on the first denaturant or combination listed in the formula.

² With sodium iodide.

³ Calculated on the basis of 85 percent ethyl acetate.

⁴ Calculated on the basis of 100 percent ethyl acetate.

**PART 22—DISTRIBUTION AND USE
OF TAX-FREE ALCOHOL****Subpart A—Scope**

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DESTRUCTION OF MARKS AND BRANDS

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**INDUSTRIAL ALCOHOL USER PERMIT, ATF F
5150.9**

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